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High Speed Pays

WHEN Mr. Lemon spoke at the winter dinner of the Permanent Way Institution recently (see THE RAILWAY GAZETTE of February 1), he mentioned the fact that high speed pays, and quoted as evidence the example of the gratifying results obtained by speeding up certain trains on the L.M.S.R. We observe, from a recent issue of our American contemporary the *Railway Age*, that similar satisfactory results have been achieved by two specific new high speed services in the United States. From its inauguration on January 2 to January 31, the Four Hundred of the Chicago & North Western, operating a 60 m.p.h. schedule over the 408½ miles between Chicago and the Twin Cities, carried an average of 320 persons daily, necessitating the addition of an extra car to the standard formation every day. The patronage of this train has not been taken from other North Western trains operating between the same points, so that it may be assumed that this new fast service has brought entirely new traffic. The earnings of the train have been more than double the direct cost of operation. The other American example is that of the Burlington Zephyr high speed articulated train. During December and January the total mileage made by passengers using the Zephyr was 193 per cent. more than during the same two months a year ago on the much slower steam trains which the Zephyr has replaced. Answers to a questionnaire submitted to passengers show that 21 per cent. of them would not have travelled by railway but for the Zephyr.

Making the Best of the Waiting Room

The desirability of brighter waiting rooms was acknowledged by Mr. William Whitelaw in a speech at the luncheon of the Retired Railway Officers' Society last Monday, but he suggested that improvements would be effected more rapidly if the companies could abandon accommodation of this type at points where it is not really required. Such abolition, however, might arouse protest, for there are still many country stations where travellers choose quite illogically to foregather as much as half an hour before a train is due, and it might not be politic to deny them hospitality. It is therefore satisfactory to see that a correspondent in *The Yorkshire Post*, who writes from Holmrook, Cumberland, commends the initiative of certain local stationmasters in making existing waiting accommodation habitable without incurring new expense. Cleanliness and the repair of furniture are, of course, the points to which attention has principally been paid, and we hope that in scrubbing the walls and scrapping torn or dirty posters the state of the windows has not been forgotten, and that they have been opened. A widespread campaign of this sort would deserve encouragement, for the ingenuity displayed by railway staff in such traditional embellishments as the station garden suggests happy results if it were officially directed to the waiting room.

* * * *

The Week's Traffics

Although advances are again shown by the passenger receipts of the group companies, they are smaller in every case than last week, but the difference is only £1,000 in the case of the L.M.S.R. and the Southern Railway. The L.N.E.R. improvement, however, is substantially less than the £12,000 recorded in the 9th week, and the Great Western decline has increased by £2,000. Nevertheless, the aggregate passenger takings still total £185,000 better than at the same period of last year. Coal traffic was a little better except on the Southern, and in general merchandise the L.M.S.R. converted a deficit of £19,000 last week into a gain of £1,000.

	10th Week				Year to date.
	Pass., &c.	Goods, &c.	Coal, &c.	Total.	Inc. or dec.
L.M.S.R.	5,000 +	1,000 -	9,000 -	3,000 -	63,000 - 0.59
L.N.E.R.	3,000 -	16,000 -	15,000 -	28,000 -	141,000 - 1.75
G.W.R.	3,000 -	3,000 -	11,000 -	17,000 -	26,000 - 0.59
S.R. ...	6,000 -	7,500 -	5,500 -	7,000 -	27,000 - 0.82

The partial strike in the Free State affected the total takings of the Great Southern Railways to the extent of £16,049, but the company's aggregate receipts are better by £31,222.

* * * *

A Punctuality League

It is often urged that a system of bonuses for time recovery would improve the punctuality of British trains. There is, however, an objection to the plan in that although it rewards the energy of enginemen it fails to inspire alacrity in others who may have been responsible for the delays from which recovery is made. In this country, at least, there are few more effective stimuli than an element of competition, so that by putting the matter on a sporting basis and giving every man concerned with the running of trains an opportunity of winning points for his district, the L.M.S.R. Operating Department has taken a forward step in an important matter. The scheme is described in the March issue of *On Time*. Districts in England, Wales, and Scotland have been allocated to Punctuality Leagues according to their operating records and local conditions. The same considerations regulate the standard required to win 1,000 points, and it is a happy inauguration to the plan that of the eight districts

which passed this total in the four weeks to January 26, five were in League Three. These records are kept of local passenger, excluding electric, trains, but *On Time* is now publishing a monthly pictorial diagram of express punctuality.

Overseas Railway Traffic

The carnival holidays occurred during the 36th week of the South American companies, but decreases were shown by only two systems. For the 35th week, traffics were in every case better than for the corresponding period of the preceding year. The rate of exchange has assisted the results, particularly over the carnival period, having stood during the past fortnight at 16.92 pesos, against 16.99 and 17.15 for the 35th and 36th weeks of 1934. The aggregate traffics of the Buenos Ayres & Pacific and Buenos Ayres Great Southern Companies present a slightly more favourable comparison with the preceding year than at the end of the 34th week, but the Buenos Ayres Western and Central Argentine declines are more marked. Argentine North Eastern results for the two weeks under review showed a fall of £243 and a gain of £93, but the Entre Rios company recorded increases of £2,205 and £1,662 in the same period.

	No. of Week	Weekly Traffic	Inc. or Decrease	Aggregate Traffic	Inc. or Decrease
Buenos Ayres & Pacific	36th	95,272	+ 1,744	2,635,679	- 378,057
Buenos Ayres Great Southern	36th	188,889	+ 13,904	5,087,356	- 727,745
Buenos Ayres Western	36th	48,463	- 1,624	1,570,189	- 309,037
Central Argentine	36th	109,628	- 7,209	4,238,975	- 595,331
Canadian Pacific	9th	448,400	- 6,600	3,833,000	- 130,200
Bombay, Baroda & Central India	48th	185,475	- 7,950	7,598,100	+ 299,475

The Watford & Edgware Railway

The legal obsequies of this scheme are now being carried out, following a resolution passed on February 22 for the voluntary winding-up of the Watford & Edgware Railway Co. Ltd. As long ago as August 11, 1903, an Act (3 Edw. VII, cap. 189) incorporated the Watford & Edgware Railway Company as a statutory body with powers to build a railway 6 m. 1 f. 7 ch. to Watford from a junction with the authorised Edgware & Hampstead Railway. Working agreements with the Underground company were authorised, and the line was to have been a surface extension of the present tube. The powers, which were never exercised, expired on August 10, 1911. Watford was not ignored, however, and the reason for the powers being allowed to lapse was seen in the following year (1912) when the London Electric Railway Company secured Parliamentary sanction to link up the Bakerloo tube with the L.N.W.R. by means of a link from Paddington to Queen's Park. The latter was completed on February 11, 1915, and enabled the through running of tube trains to Watford over L.N.W.R. metals as from April 16, 1917. After the formation of the L.P.T.B. it was decided to wind up the Watford & Edgware Railway, and on November 1 last a resolution was passed assenting to the registration of the limited company now placed in liquidation, which was incorporated on December 10 for the purpose of dissolving the statutory company by means of Part IX of the Companies Act, 1929.

"It's Your Property"

Only a state railway system could admonish its passengers as to appropriate care of its rolling stock on the ground that its coaches are, in effect, their own property. "You, as a passenger," remarks the official time-table of the Victorian Railways of Australia to its reader, under the above heading "are required to protect your own property, and to check and report to a railwayman any vandalism you may have witnessed. Much of the beauty

and finish of railway carriages can be marred in a minute by carelessness or vandalism. Never place your feet on polished woodwork or carriage seats." This is but one of the notes in this enterprising time-book, which are intended to interest the patrons of the Victorian Railways in "their own property." Details are given as to the first train run in Australia, which was in 1854 from Flinders Street, Melbourne, to Sandridge; and the reminder is added that since then Victoria has spent £77,000,000 on her railways. The value of co-operation between passengers and the management is stressed as an avenue towards greater efficiency, and also the value of the huge railway market to Australian manufacturers, which would be even greater with increased railway business. Facts and figures are added as to the Melbourne electrified suburban railways, the development of railway signalling and many other matters of interest. Luggage hints to careless passengers are also given, such as "Unaddressed luggage goes somewhere. But the question is—where?"

Economical Development in the Air

Air transport has one great economic advantage over most other methods of communication, which makes its development easier and probably in the long run more efficient. The railway company or the road maker, once he has decided upon the area in which to concentrate his efforts, is bound by the capital investment he makes in fixed equipment to confine himself to that territory. Apart from landing facilities, the promoters of air transport, however, have no fixed equipment which limits them in their development of traffic. If services in one direction are found to be unremunerative, no great difficulty is involved in pursuing traffic in another direction. This fact, which is fortunate in that it allows for economical development, is to be clearly seen by a study of the internal airways in this country. Moreover we understand that ground wireless equipment, an important item of high capital cost, is to be provided by the Air Ministry in the form of mobile units capable of following the air routes as they may change from time to time.

Telephones on the Norwegian Railways

The great improvements made in telephony in recent years have induced many railways to replace telegraphs by telephones for some classes of work, if not altogether. Opinions vary on this matter, but notwithstanding the great convenience of telephones for certain services there still remains, we think, a considerable field for the use of telegraphs of modern type in railway working, as some railway managements have indeed recognised. The Norwegian State Railways, as related by Herr H. Andersen in the *Nordisk Järnbanetidskrift*, have been replacing telegraphs by telephones on an extended scale and have spent already about £4,000 on the work. Originally the Wheatstone needle telegraph, then the Siemens & Halske & Digney step-by-step telegraphs, were adopted in Norway, to be followed later by the Morse inker. The Digney apparatus lasted until 1919 on the Bergen-Voss section. The Morse inker system possessed the advantage of simplicity and left a record of the messages exchanged, but it necessitated trained operators, which telephones do not. The retention of two means of communication on sections where one could meet all reasonable needs seemed unjustified and the change is expected to bring not only a saving but an acceleration of business. It has been necessary to alter the rules concerning train reporting to permit of the use of the telephone for all purposes, a step previously taken in Sweden also.

Whistling at the Frontier

Those to whom travelling brings pleasure for its own sake, and who like nothing better than to move from scene to scene and from one land to another, often feel a fascination, real enough if difficult to explain, in crossing a frontier. As they approach one in the train they will look to see the precise spot where one country is considered to end and another to begin. In some cases it is marked clearly enough by signboards or landmarks, and the traveller interested in railways can often detect the change in sound as the train passes from one style of permanent way to another, although this is not possible owing to the lines occasionally belonging to the same administration in both territories. Coming from Germany into Holland, the change in the level crossings is noticed, for the lifting barriers with their watchmen and large signal bells disappear, and the open, unattended crossings with their signs, *Let op de Treinen*, take their place. The transition from Sweden into Norway is announced by an audible signal, for we read in the Norwegian timetables that "the locomotive gives a whistle signal when about 200 metres before reaching the frontier, and another as it crosses it." Incidentally, the train working, as well as the road traffic, follows opposite rules in these two countries, being left-handed in Sweden and right-handed in Norway.

* * *

Improved Results in Sweden

The earnings of the Swedish State Railways for 1934 amounted to Kr. 183,800,000 compared with Kr. 166,200,000 for 1933. As expenditure rose to Kr. 155,200,000 compared with Kr. 150,200,000, there is an improved surplus of Kr. 28,600,000 against Kr. 16,000,000 in the previous year. The earnings include certain remunerations, totalling Kr. 6,950,000, to be paid to the State Railways by the ore-mining company Luossavaara-Kiirunavaara A.B. The capital invested in the State Railways, which have a total length of 7,517 km. and employ a staff of 26,395, amounted at the end of 1934 to Kr. 1,300,000,000. According to a statement of the Riksdag in 1929 it was not expected that net earnings in 1934 would cover the interest due on more than Kr. 745,000,000 of that capital. On the basis of an average bank rate of 4.16 per cent. Kr. 31,000,000 would be required to cover the full interest. That figure has not been quite attained, but the difference for 1934 is only Kr. 2,400,000 compared with a deficit of Kr. 15,000,000 for 1933. For 1934 the sum of Kr. 18,700,000 has been assigned to the renewal fund, which *inter alia* contributes to some extent to the cost of electrification. For 1933 the corresponding amount was Kr. 17,400,000. The number of passengers in 1934 rose to 36,600,000 from 32,700,000 for 1933, with a corresponding rise in ticket earnings from Kr. 60,000,000 to Kr. 66,000,000. The quantity of iron ore transported was 3,200,000 tons, or double that (1,600,000) for 1933. Other goods transported rose to 9,800,000 tons from 8,300,000, with a corresponding rise in earnings to Kr. 91,000,000 from Kr. 79,200,000.

* * *

The High Speed Articulated Locomotive

For many years past the Garratt locomotive has exhibited a definite capacity for speed and has accordingly been employed to a limited extent on passenger services. The express passenger Beyer-Garratt locomotive designed by Beyer, Peacock & Co. Ltd. about three years ago for the Algerian Railways marked a further step forward. The announcement in our Contracts and Tenders section this week, and the article also included elsewhere in this issue, which refers not only to the successful trials of this engine but also to a decision to employ this type of

locomotive extensively, calls attention to an extending field of development in steam locomotives in the realm of high speeds. The new locomotives, of the double-Pacific type, will have a boiler pressure of 290 lb. per sq. in., and Cossart valve-gear, and embody various modifications suggested by the extensive trials conducted with the original locomotive. The twelve new locomotives are to be employed on the Algiers-Oran and Algiers-Constantine sections, totalling 500 miles of standard gauge line. A maximum speed of 80 m.p.h. is required, together with a high average speed up long grades of 1 in 40 and 1 in 50. According to the investigations of the French authorities, this type of locomotive provides the necessary power for the grades, while at the same time making possible the incorporation of a wheel diameter and wheel arrangement suitable for high speed with perfect stability.

* * *

Locomotive Crank Axles

The crank axle of a locomotive is one of its most vital parts, and for long it was debated whether it should be produced as a solid forging or built up from separate components. This unit, together with the connecting rod, is subjected to heavy stresses in transmitting power to the wheels, and in the aggregate quite a lot of trouble and anxiety have been caused both in this country and abroad in the detection of fractures and other causes of failure. The millions of revolutions made by a locomotive crank axle in the course of its life, and the enormous amount of power it transmits, may be set against the relatively few serious failures nowadays encountered, credit for which immunity is in part accounted for by metallurgical advances and in part by improved methods of design and manufacture. The subject is one of great importance and interest to railway mechanical engineers, and the article appearing on pages 510 to 517 of this issue will, we venture to think, be a valuable addition to literature on the subject. It deals with the practice followed in machining and assembling built-up crank axles for Mr. Gresley's numerous and successful class of three cylinder 4-6-2 type express engines on the L.N.E.R., which, incidentally, are the only Pacifics with three cylinders in this country. The methods of producing these axles represent very sound practice and the results have fully justified the intensive research made before they were adopted.

* * *

The Cost of Weight Reduction

An article by Mr. E. J. W. Ragsdale in a recent issue of the *Railway Age* dealt with an aspect of light-weight construction which will assume increasing importance as the practice becomes more widespread. There are a number of low alloys of steel which may recommend themselves to builders of rolling stock by their cheapness, but Mr. Ragsdale pointed out that their place is not in the construction of high speed light-weight units because they do not provide the higher factor of safety demanded by such service. They have a purpose in railway work, but it is to reduce the weight of ordinary 130,000 lb. stock, which they may legitimately do to the extent of some 30,000 lb., rather than to be used in the application of light-weight constructional principles. Had the new alloys been used in the Burlington Zephyr, the weight of the structure itself would have had to be increased from 46,000 lb. to 116,000 lb. in order to equal the tensile strength of the stainless steel of which the train is actually built. This would entail heavier bogies, a train load increased by 27,000 lb., and the use of 300 h.p. more for propulsion. Although \$14,200 would have been saved in basic material cost, the larger power unit would effectively outweigh the apparent saving by an additional expense of \$31,000.

Agreed Charges

REFERENCE was made at the recent annual general meetings of the railway companies to the value of the powers granted them under the Road and Rail Traffic Act, 1933, to enter into agreements, subject to the approval of the Railway Rates Tribunal, for the conveyance of traffic by goods or passenger train at agreed charges. Up to the present the companies have confined their negotiations for such charges solely to traders who have applied for their traffic to be charged on this basis for the purpose of enabling them to facilitate their business or effect costing or clerical economies. Having regard, however, to the exaggerated statements which are appearing in certain road transport journals concerning the extent of the additional business which is being secured by the railway companies through the medium of this form of charging, it should be pointed out that, while since January 1, 1934, the Railway Rates Tribunal has sanctioned the introduction of about 230 agreed charges, they were all for limited periods not exceeding twelve months and, in fact, the number in operation today is only about 140. On the other hand, the number of cases considerably exceeds 600 where applications for such charges have been declined after careful investigation or have not been proceeded with for various reasons. This appears to indicate that the traders concerned had hoped that the introduction of an agreed charge would have enabled them to effect a substantial reduction in their transport costs.

An essential preliminary to the calculation of an agreed charge is obviously a careful analysis of the traders' actual carriage accounts over a representative period for the purpose of reaching a true summation of his transport costs. When this has been accomplished it is easy to calculate the actual charge on a tonnage or package basis as may be desired. The problem becomes decidedly more difficult where a trader is carrying out a portion of his business by road at a cost which is appreciably lower than the appropriate railway charge. Such cases have to be considered very carefully in order to ensure that the inclusion of road costs at what the companies consider to be an economic figure does not unduly depress the proposed agreed charge and cause reactions on railway rates generally. There seems no doubt that the agreed charge principle is likely to become a permanent feature of railway commercial practice, but the very extensive investigations which have already been carried out have made it clear that the principle is not suitable for every type of business. It would appear to be most suitable in the case of proprietary articles such as soap, groceries, wireless sets, &c., which are sold throughout the country at the same price.

So far as the railway companies are concerned, the adoption of agreed charges has enabled certain savings to be effected in clerical and accountancy work, but due to the necessity of conducting periodical tests of the traffic where such charges have been introduced, it is not possible in many cases to quantify them. Of considerably greater importance is the fact that the introduction of agreed charges has enabled the companies to retain traffic to the railways and, in some instances, to re-secure traffic which had previously been diverted from rail to road as, generally speaking, the grant of the charge is conditional upon the trader forwarding the whole of his traffic by railway except in certain strictly defined cases to meet particular requirements of the business concerned. It is important to note that the Rates Tribunal, when hearing applications for the approval of such charges, requires to be satisfied that the position could not be met by the introduction of exceptional rates and that the net revenue of the interested railway companies might reasonably be

expected to be greater than if the charge were not introduced. The agreed charges already authorised cover such diverse traffics as groceries, provisions, tobacco, cigarettes, druggists' and horticultural sundries, vacuum cleaners, hardware, motor bicycles, dyed goods, wines and spirits, live pigs and dead rabbits. These are all charged on a package, tonnage or animal basis, with the exception of F. W. Woolworth & Co.'s traffic which is charged on an agreed percentage of that company's annual turnover.

* * * *

Factory Sites and Private Sidings

A RECENT article in our contemporary *The Engineer* on the selection of a factory site gives much interesting and helpful information on the subject with useful hints as to what should be avoided in making a choice for a new layout. Transport facilities naturally figure largely in the author's directions, and what he has to say about adequate road approaches and the advantages or disadvantages of proximity to rivers and inland navigations is valuable. It is, however, much to be regretted that when he comes to deal with railway communications and the establishment of private sidings his guidance should be in so many respects unreliable. He says for instance that "it will sometimes be found that although the railway companies are bound to give siding facilities to anyone who asks for it, it is left to them to decide at what particular point in their system the connection shall be made. Thus, after numerous delays and conferences, the purchaser may find that having obtained the railway company's agreement to give siding accommodation, he will have to pay very heavily for it, and probably find that the bulk of what he is expected to pay for, including one or two bridges, is not his property. The actual facilities provided by the company may be anything but convenient for his traffic, and lastly, he may find the actual rebates gained by him are not commensurate with his expenditure. . . . Usually private siding connections are taken from a point where a goods loop occurs by means of a locked switch, the key of which is kept in a nearby signal cabin. The engine driver must obtain this key from the signal-box before he can enter the siding. This means that the siding connection must be near a signal-box and within view of the signalman, or else be made from the nearest railway company's siding. To do this may involve the construction of about a mile of siding track with perhaps an overbridge across some road. The cost of this will have to be borne by the purchaser, including the maintenance cost."

We are forced to the conclusion that the writer of the article must have had an unfortunate experience at some time or other as the difficulties which he describes are certainly not such as would be met with to-day. The railways, realising quite clearly, as they do, that the establishment of a siding postulates a regular traffic, have every incentive to facilitate the creation of private siding connections. Naturally, before a connection can be agreed to, working conditions have to be investigated and the most suitable layout decided upon. This as a rule is most expeditiously and conveniently studied by a meeting on the ground of all parties concerned. It is true also that the cost of the siding is borne in the first instance by the prospective user as it cannot be considered commercially sound that the railways should put in sidings whenever requested for a problematical traffic. The first cost, however, having been incurred, the user promptly commences to reap the advantage of his outlay in reduced rates applicable to traffic emanating from the siding. Again, the writer's suggestion regarding the working of the

sidings, though applicable in certain instances, is certainly misleading when it represents that the system is universal. Here too, the railway companies are sufficiently commercial in their outlook to endeavour so to plan the siding that its use will be both easy and economical, and the picture of a mile "lead" from the connection to the works savours of the fantastic. It may be taken that when a siding has been paid for it remains the property of the trader.

* * *

L.N.E.R. World Records

CAREFUL examination of the times achieved on the experimental runs of March 5 from King's Cross to Newcastle and back makes it clear that a sheaf of speed records passed into the hands of the L.N.E.R. on this occasion. Apart from the maximum speed of 108 m.p.h., which, so far as fully authenticated evidence is available, has never previously been reached with steam, long-distance records were created that set up some entirely new standards of steam locomotive performance. These are described in detail in an article on page 501, and, briefly summarised, were as follows. From London to Newcastle and back, with allowance only for the out-of-course slowing through Arksey, where some wagons had been derailed, the average speed, including starting, stopping, and all ordinary service slacks, works out at 70.4 m.p.h. for 536.6 miles. Excluding the mining area in Durham, where reduced speeds were necessary, the average from King's Cross to Croxdale, and Croxdale back to London, a distance of 500.4 miles, inclusive of all slowings other than Arksey, rises to 73 m.p.h. Taking the highest speed stretches of the run, and with no allowances of any kind, the remarkable fact emerges that this one locomotive, in a single day's round trip, covered, at an average speed of 80 m.p.h., an aggregate distance of no less than three hundred miles. All these undoubtedly constitute world records for steam haulage.

Should such speeds as those set out above become general, certain factors bearing on continuous high speed running will doubtless require close consideration. On the locomotive side, one of these is the matter of lubrication. A non-stop run for 4 hr. at a stretch in such sustained speed conditions as those of March 5 must make a severe demand on the efficiency of the best lubricants and lubricating systems, and were streamlining to be added to the locomotive equipment, the matter might be further complicated by the reduction in the atmospheric cooling of the external working parts as a result of their being closed in. The latter has not proved to any extent disadvantageous up to the present in the German streamlining experiments, but no streamlined German locomotive has yet been put to so exacting a test as the L.N.E.R. engine *Papyrus* on March 5. Highly skilled driving is, naturally, a *sine qua non* for long continuous runs at average speeds of the order of 70 m.p.h., and the L.N.E.R. may be congratulated on having in its service men like Drivers Sparshatt and Gutteridge, who performed so ably on the Newcastle test runs. Scarcely less important is efficient organisation, personnel and equipment at running sheds where the locomotives have to be attended to.

From the track point of view, the question of super-elevation on curves comes into prominence. The stretch of line on which 100 m.p.h. was maintained is free from any but the slightest of curvature, and the riding of the train over it was perfect; furthermore, such maxima as these, in the present stage of steam locomotive development, are not likely to be common, and will be confined to certain well-defined lengths of track on which the conditions are suitable. Only at certain summit points, where

the speeds of the test trains were far higher than those normally run, did the sensations in the train suggest that slightly more superelevation might be desirable; but even so, there was no sensation of discomfort, merely the consciousness that the train was traversing a curve. Here again, as in the case of the maintenance of the locomotive, a high standard will be called for in the maintenance of the track, and yet again congratulations may be offered to the L.N.E.R. in this respect. Finally, the design of the locomotive, from the general arrangement down to the minutest details, calls for a nice combination of ingenuity and practical experience. No one in the railway world today combines these qualities better than the Chief Mechanical Engineer of the London & North Eastern Railway, Mr. H. N. Gresley, than whose standard Pacific express locomotive design there is no more generally efficient locomotive in existence.

* * *

Eight-Coupled High-Speed Engines

FROM the days of Ross Winans' Mud-Digger in 1844 until a few years ago, the eight-coupled locomotive was looked upon almost solely as a machine for slow and moderate speeds. Within the last ten years, however, several designs have been introduced for fast main line passenger work, and have shown their ability to maintain with ease speeds up to 75 m.p.h. The new L.N.E.R. 2-8-2 express engines have exceeded 80 m.p.h., although they were designed rather with a view to rapid acceleration and fast hill climbing with heavy trains. The advent of these modern locomotives has tended to disprove the old theory that an eight-coupled engine, with its lengthy rigid wheelbase, must necessarily have high internal and rolling resistances. It seems, therefore, that new resistance investigations are due, for the power absorbed by present-day eight-coupled passenger engines is obviously much below what one is led to expect from the various formulae extant, and for routes of reasonable alignment where heavy trains are a regular feature, such locomotives may be eminently suitable for high-speed working.

This was brought home to us recently when making a footplate trip on an eight-coupled engine which, hauling well over 600 tons, averaged 73 m.p.h. for 100 miles, and which achieved 90 m.p.h. downhill. That the engine was not absorbing anything like its maximum cylinder power was proved by the fact that more than 1,000 drawbar horsepower was being exerted. According to Fry's resistance rule for eight-coupled engines, the locomotive at this point should have been absorbing about 2,250 h.p. in propelling itself, or, say, 1,800 h.p. allowing for the larger wheels compared with those on which Fry based his figures. This means that the engine should have been indicating a total of something like 3,500 h.p., but from the position of the regulator and the magnitude of the cut-off, compared with those at much higher drawbar pulls at speeds only 7 to 10 m.p.h. less, we formed the opinion that a good deal less than 1,800 h.p. was sufficient to propel the engine and tender. The riding at the top speed although not so smooth as that of a streamlined diesel train, was by no means rough, and it is extremely probable that an engine such as the Austrian 2-8-4, with a Krauss truck at the front and a spring-controlled bogie at the rear, would give better riding qualities. With recent advances in design (more especially as they effect exhaust arrangements), and streamlining such as is now being applied in Germany, Poland, Japan, and the U.S.A., it is possible that a new era will open for the eight-coupled steam locomotive, in which full advantage will be taken of the extra adhesion weight without in any degree sacrificing the qualities of the six-coupled engine as regards free running on the level or downhill.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

High Speed Steadiness—A Theory

Coll-Earn,
Auchterarder,
Perthshire.
March 10

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—By the courtesy of Sir Ralph Wedgwood, I had the pleasure of riding on the L.N.E.R. high-speed test train of Tuesday, March 5.

I made many trips in the "Railway Race" of 1895 between London and Aberdeen. In those days the track was much poorer and the East Coast coaches were long rigid-wheelbase 6-wheelers, while the West Coast ones were non-bogie, 8-wheel chain-slung vehicles. Hardened observers like Sir W. M. Acworth, the Rev. W. J. Scott, Rous-Marten and myself, were much struck by the way the trains settled down to steadiness when the speeds rose above 65 or 70 miles an hour, like tops asleep.

On March 5 I heard the same thing being remarked on by everyone (especially the laymen) when we soared above 80 up to 108 m.p.h. There was an old 1st class coach on the train of the blue cushion period which, at ordinary express speeds ran none too smoothly. But I found it had its lesson to teach for when we were hurtling for miles well above 100 m.p.h. I paid it a visit and found it had settled down to a quiet life. So also I explored the rear of the train and found the whip-lash waggle practically gone. The officials in charge of the three Hallade machines on the floors said there was a wonderful absence of oscillation shown by their charts.

On an "Atlantic City Flyer" run, when we did the 55½ miles start to stop in 44 minutes, with a train almost to a ton the weight of Tuesday's, the coaches had vestibules and centre passages. We kept up about 84 m.p.h. for 35 miles on end (on a level line), during which I ran from one end of the train to the other and back without being lurching against seats or doors. So also on a Central Railroad of New Jersey express at over 84 m.p.h.

I puzzled for many years over this phenomenon, and then this came to me. Can I be right in thinking that at high speeds every particle of the train has no time to do anything except to go straight forward; in short, should

the train be looked on as merely a large mis-shapen bullet? Let the scientists solve the riddle.

I remain, yours faithfully,
NORMAN D. MACDONALD

Main Line Electrification

Tisbury, Wilts,
March 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The sketch map which you published in your issue of March 8 of the main line electrification, completed or in progress, of the old L.B. & S.C.R. system, now Central section Southern Railway, suggests an enquiry as to why the advertised time of the best train between London and Brighton is still 60 min. A steam hauled train to that timing commenced running in the Sunday train service, both up and down, as far back as October 2, 1898.

In 1903 proposals were seriously made for the construction, by an independent company, of an electric railway between London and Brighton, to run the distance in 50 min. or even less. The L.B. & S.C.R. decided, therefore, to show what steam could do on its line, and on Sunday, July 26, of that year an experimental train was run, with approximately 130 tons behind the tender from Victoria to Brighton in 48 min. 41 sec., and the return journey in 50 min. 21 sec. The weather conditions were not favourable for either journey or an even better record might have been achieved. As the opposition railway was never made the L.B. & S.C.R. never improved on its 60 min. advertised timing, but the experimental run remains on record as evidence of what was regarded over thirty years ago as a practical timing for a steam hauled train between London and Brighton. The fastest electric today takes 10 min. longer.

Details of the experimental run were given in *The Railway Magazine* for September, 1903, by the late Charles Rous-Marten in an article on "British Locomotive Practice and Performance." He timed the train and states that at one point the speed on the down journey touched 90 m.p.h.—a figure corroborated by another independent observer and also by the automatic register of R. J. Billinton's speed-recorder.

Your obedient servant,
REGINALD B. FELLOWS

Forthcoming Events

Mar. 15 (Fri.).—Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "An Introduction to Railway Heraldry," by Mr. G. W. J. Potter.

Electrical Development Association, at Savoy Hotel, Victoria Embankment, London, W.C.2, 12.45 for 1 p.m. Annual Luncheon.

Institute of Transport (Leeds Graduate), at Church Inst., Albion Place, 7 p.m. "Telegraphs and Transport," by Mr. J. W. Dodd.

Mar. 16 (Sat.).—L.N.E.R. (Great Central) Lecture and Debating Society, at University College, Shakespeare Street, Nottingham, 4.30 p.m. "History of the Great Central Railway Company," by Mr. C. E. R. Sherrington.

Mar. 18 (Mon.).—G.W.R. (Birmingham) Lecture and Debating Society, at Great Western Hotel, Snow Hill Station, 6.30 p.m. "Some Aspects of Social Credit," by the Most Hon. The Marquis of Tavistock. Engineers' German Circle, at Inst. of Mechanical Engineers, Storey's Gate, London, S.W.1, 5.15 p.m. "New Trends of Development in German Refrigerator Design," by Prof. Dr.-Ing. R. Plank.

Mar. 19 (Tues.).—Industrial Transport Association, at British Iron and Steel Federation, Caxton House (East), Tothill Street, London, S.W.1, 6.30 p.m. "The Future Prospects of the Industrial Traffic Manager," by Mr. J. J. Hughes.

Institute of Transport (London), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "The Co-ordination of Ports with other Transport Undertakings," by Mr. T. R. Toovey.

Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. Ordinary Meeting.

Mar. 20 (Wed.).—Institution of Locomotive Engineers (Birmingham), at Queen's Hotel, 6.45 p.m. Discussion on Mr. Griffiths' paper No. 116.

Institute of Transport (Scottish), at Glasgow. Visit of the President.

Mar. 21 (Thurs.).—G.W.R. (London) Lecture and Debating Society, in General Meeting Room, Paddington Station, 5.45 p.m. Annual General Meeting.

Institution of Locomotive Engineers (Scottish), at Royal Technical College, George Street, Glasgow, 7.30 p.m. Ordinary Meeting.

Institution of Production Engineers (Glasgow), at Inst. of Engineers and Shipbuilders, 7.30 p.m. "Prevention of

Distortion in the Heat Treatment of Steel," by Mr. W. Brazenall.

Railway Students' Association, at London School of Economics, Houghton Street, W.C.2. "Is the Pedestal on which Competition is Enthroned Tottering?" by Mr. W. L. Hichens.

Mar. 22 (Fri.).—Institute of Transport (Manchester-Liverpool), at Exchange Station Hotel, Liverpool, 6.30 p.m. "Some Aspects of Municipal Transport Amalgamation," by Mr. C. H. Stafford.

United Kingdom Railway Officers' and Servants' Association, at the Trocadero, Shaftesbury Avenue, London, W.1, 6.30 for 7 p.m. 74th Anniversary Festival.

London & North Eastern Railway Musical Society, at Hamilton Hall, G. E. Hotel, Liverpool Street, Bohemian Concert, 8 p.m. Miss Wedgwood in the chair.

Mar. 28 (Thurs.).—Institution of Locomotive Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. "Speeding up of Train Services," by Mr. E. W. Selby.

Apr. 2 (Tues.).—Railway Benevolent Institution, at Connaught Rooms, Great Queen Street, W.C.2. Anniversary Festival.

Retired Railway Officers' Society, at Abercorn Rooms, Liverpool Street, London, E.C.2, 2.30 p.m. Ordinary Meeting.

PUBLICATIONS RECEIVED

G.W.R. Holiday Haunts, 1935. 8½ in. × 5½ in. × 1½ in. Illustrated. Paper cover. Price 6d. net.—The fact that this is the centenary year of the Great Western Railway lends additional interest to the latest edition of this popular publication and provides Mr. Maxwell Fraser, the compiler, with material for an opening chapter of a retrospective character which will, we feel sure, be heartily appreciated by those who travel either for business or pleasure on the "holiday line." The chapter in question is admirably written and gives the reader a very clear idea of the wonderful way in which the G.W.R. has developed the resorts on its system during the first hundred years of its existence. It is preceded, very appropriately, by a tinted pictorial supplement in which figure many objects of interest associated with the great railway company—including, for example, a reproduction of Frith's famous picture of Paddington station. For the rest, the handbook retains its many familiar features, chief among these being the exceptionally fine series of photographic reproductions accompanying the descriptive letterpress, the latter being divided into seven sections, namely:—(1) London and Southern counties; (2) The Cornish Riviera; (3) Glorious Devon; (4) Somerset, Dorset and Channel Islands; (5) North Wales; (6) South Wales and Monmouthshire; and (7) Midland Counties and Isle of Man. A fine coloured plate of Torquay serves as a frontispiece; there is a large folding map, very clearly printed, of the G.W.R. system; and, in addition, many exhaustive details respecting fares, stations, accommodation, &c.; also a special supplement containing much useful information concerning mail, passenger and freight steamship services to all parts of the world. The handbook, which totals 1,024 pages, is enclosed in a handsome letterpress cover in pale yellow, dark brown and gold.

Holidays by L.M.S., 1935. 8½ in. × 5½ in. × 1½ in. Illustrated. Paper covers. Price 6d. net.—In this attractive volume of 1,016 pages (40 more than last year) and over 270 illustrations, it is proudly contended that the L.M.S. is the holiday line—a veritable magic carpet whereby the reader may be whisked from office or factory to the holiday of his dreams! The experienced holiday-maker does not need to be told that the L.M.S. system is pretty far-flung and includes some of the choicest spots and finest scenery in England and Wales. How these may be reached with a minimum of trouble to the traveller is clearly indicated in the handbook. The descriptive sections cover Wales, the English lakes, the Lancashire coast, the West of England, the Midlands, London and Eastern England, Southern England, and also (under the heading of "Island Holi-

days") the Isle of Man, the Isle of Wight and the Channel Islands. Each section is mapped and beautifully illustrated and contains many tabulated pages relating to the various local hotels, boarding houses, &c., with sundry informative "remarks" directly bearing on the accommodation available thereat. A fine and large folding map of England and Wales which can be detached for the convenience of holiday-makers is given with the guide—which, by the by, opens with a small illustrated section wherein will be found much useful information about the L.M.S. hotel service in England and Wales, sleeping cars, reserved seats, caravan coaches and road excursions. The holiday spirit which distinguishes so many of the charming pictures aforesaid is also a pleasing feature of the brightly-coloured cover—whereon are depicted a handsome young couple in an open boat and "mit next to nodings on," obviously enjoying their *dolce far niente*.

L.N.E.R. Holiday Handbook, 1935. 8½ in. × 5½ in. × 1½ in. Illustrated. Paper cover. Price 6d. net.—Attractively bound in a cover of bright yellow with a fanciful design, this well-known annual, which has been out only a week, is a conspicuous feature on all L.N.E.R. bookstalls, and already, we hear, is in steady demand. This is not to be wondered at, for the handbook has long been an established favourite, and its perusal by the family circle at this chilly period of the year doubtless brings with it a large measure of pleasurable anticipation. The book's many striking illustrations of summer scenes typifying the holiday spirit of the nation unquestionably makes a widespread appeal and as, this year, many fine new camera studies are included, the attractiveness of the pictorial section is thereby very considerably enhanced. Prefaced with a serviceable epitome entitled: "Glimpses at the Guide," there follows an extremely useful section indicating what the railways provide for the comfort and convenience of passengers in the way of tickets—tourist and other—motor cars, reserved seats, walking tours, luggage, sleepers, &c., together with an interesting announcement of certain new and free publications, which will be available in May, relating to "New Ways for British Holidays," and camping coaches and hostels. The handbook, which contains 812 pages all told, consists of four imposing and well-arranged sections dealing with Eastern Counties, Yorkshire, Northumberland (Durham and the Lake District) and Scotland, in that order. Each of these sections contains a descriptive and illustrated account of the region concerned, together with an imposing list of the hotels and boarding houses which are to be found therein. Two folding tourists' maps, in colour, are included: one of England and one of Scotland, and both showing very clearly the route of

the London & North Eastern Railway and its connections.

S.R. "Hints for Holidays," 8½ in. × 5½ in. × 1½ in. Illustrated. Paper covers. Price 6d. net.—The attractions of the "Sunshine Line" are well and truly indicated in the volume now before us, and full justice done to "its unique holiday resorts," to quote the Chairman of the company at the recent annual meeting—who, it may also be recalled, emphasised the interesting fact that 60 of the most sunny spots in the kingdom are on the Southern system. The wide area covered by the railway is clearly described and profusely illustrated, with a number of sectional maps thrown in by way of a useful make weight. Interspersed here and there are columns of tabulated hints respecting the accommodation to be found in the different areas, together with many pages of hotel and other advertisements having a direct bearing on the subject. There is a page devoted to the sunshine records of 1934 based on Meteorological Office figures, which proves that the term "sunshine line" is no mere figure of speech when applied to the Southern Railway. Scattered about the handbook in the form of well-displayed advertisement pages, is a large amount of information which will specially appeal to the prospective holiday maker, such as: Fares, various kinds of cheap tickets, luggage in advance, a list of S.R. guide books, road transport companies in association with the S.R., camping coaches, seven-day holiday "seasons," Railway Air Services, reservation of seats, baggage insurance, seaside cruises by S.R. steamers, &c. The handbook, which consists of 936 pages, is provided with an attractive coloured wrapper, on the front of which is a bright golden-haired young thing in an alluring bathing costume—a concession, may be, to the multitude of gentlemen who avowedly prefer blondes.

Cutting Oils.—A pleasant and well-reproduced pencil portrait of Gottlieb Daimler (1834-1890), the pioneer petrol motor-car designer, forms an excellent headpiece to the March monthly calendar issued by Fletcher Miller Limited, Manchester, manufacturers of Cooledge water-soluble cutting oil. This firm is issuing a separate black and white stand-up card, 7 in. by 3½ in., for each month.

Aluminium Literature.—Further booklets in the useful series of practical working data published by the British Aluminium Co. Ltd. deal with rivets and riveting, annealing and heat treatment, tubes and pipes, and foundry data. The last named contains brief notes on the making up of alloys which will serve as a useful reference to large users of aluminium who undertake this work themselves. The booklet on heat treatment describes the methods to be adopted with wrought and cast alloys, giving tables of times and temperatures according to those specified by the manufacturers.

THE SCRAP HEAP

The number of persons who paid 1d. each to walk on the footpath of the London and Greenwich Railway, on Sunday last, amounted to upwards of 3,000.—From "The Times" of March 12, 1835.

YOUTH AND THE G.W.R.

In the course of his interesting remarks on the centenary of the Great Western Railway in that company's holiday handbook (reviewed on another page herein), Mr. Maxwell Fraser, F.R.G.S., says:—

"There is something so suggestive of youth in the idea of a 'Holiday Line' that there is a curious fitness in the fact that three of the men chiefly instrumental in building up the fame of the G.W.R. were young men. Isambard Kingdom Brunel, the Engineer, was only 27 at the time of his appointment; Charles Sanders, the Secretary, was 37, whilst Daniel Gooch, the Locomotive Superintendent,

who laid the foundations of the fame of G.W.R. engines, was appointed to the post when only 21!"

Of the making of maps there is no end, though few of them, it must be admitted, are conceived in the quaint fashion which distinguishes the accompanying view of the Lake District—a reproduction, very much in miniature, of a large and colourful poster recently issued by the London Midland & Scottish Railway. Good as our illustration is, the poster itself must be seen in order to appreciate to the full the map's manifold merits, some of these being so tiny in their reproduced form as to be scarcely discernible. The wonderful network of lake and mountain, which is such a glorious feature of this part of England, is very clearly indicated; and scattered about in all directions are many happy little thumb-nail sketches of local and social interest—such as,

for example, the house where Wordsworth stayed when he was a schoolboy, the Roman villa at Raven-glass, and the lady hiker who is urging her tardy lord to get a move on in her anxiety to witness the sunset from Helvellyn's lofty brow. There is much more in the same vein which is bound to provoke a smile.

Deservedly conspicuous in the lower half of the picture is an indication of the Holiday Spirit which invariably distinguishes the Lake District—here represented by a dashing young female, with wings and a golf kit, egging on to Windermere a typical family of holiday-makers, and preceded—a subtle railway touch, this!—by a sturdy and heavily-laden juvenile labelled: "Luggage in Advance." British tourists—Scots who hae wi' Wallace bled and Southrons—will note with special interest on the left-hand side of the map a representation of the Loch Ness monster. That fearsome beast is shown making for Windermere—a prophetic note this, perhaps, and one with great possibilities for the Lake District.



L.M.S. holiday map of the Lake District

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

INDIA

The 1935-36 Budget

[On page 386 of our issue of March 1, we published a telegraphic summary of the budget, which is now supplemented by the following information received by air mail from our correspondent in India.—ED. R.G.]

Revised Estimates for 1934-35

In the revised estimates for the current year ending March 31, 1935, the total deficit expected is Rs. 7.96 crores, or say £6,000,000, and the net deficit, with slight reduction on interest charges, Rs. 4½ crores, or £3½ million. For the £3 million increase in gross receipts as compared with 1933-34, goods traffic is entirely responsible. Statistics so far collected show that with the exception of oil seeds, sugar and jute, practically every commodity records increased tonnage and earnings. Notable increases are as follow:—

	Percentage Increase	
	Tonnage	Earnings
Coal	11	12
Rice	20	10
Grains and pulses ..	30	30
Metallic ores ..	40	50

These figures show that commerce and industry in India are definitely on the up grade and, in earnest of this belief, the Government of India recently announced that the basic rate for the surcharge on coal freight would be reduced on April 1, 1935, from 15 per cent. to 12½ per cent., subject to a maximum of Re. 1 per ton.

Under passenger receipts, however, there is a further fall this year, due, partly, to the reduction of third class fares on certain railways. The results of the experimental reduction of third class fares on the North Western Railway show that during the 12 months following the reduction there has been an increase of 6 millions or 11 per cent. in the number of passengers carried and a decrease of Rs. 4 lakhs or 1 per cent. in earnings. Detailed analyses of the figures are in progress. A somewhat similar experiment is also being made on the Great Indian Peninsula Railway, while the Eastern Bengal Railway administration has introduced the issue of third class return tickets at 1½ fares. Even if these innovations result in no more than a balancing of the existing financial position, the greater facilities afforded to a large number of passengers will have made them worth while.

Budget for 1935-36

The estimate of total traffic receipts on State lines during 1935-36 is Rs. 93½ crores, roughly £70 million, against Rs. 90½ crores this year. A review of the course of events for the last 18 months revealing a steady, almost continuous, improvement in goods

traffic, and an increase in the volume of passenger traffic, justifies the Government in expecting an increase of Rs. 2½ crores in traffic receipts next year. The ordinary working expenses, including depreciation, are placed at Rs. 64½ crores, or about £48 million, being a crore and five lakhs above the revised figures for this year. Of this increase Rs. 92 lakhs or nearly £700,000 are due to the decision of the Government of India not to reimpose the cuts in pay introduced three years ago as an emergency measure. The working expenses include an expenditure of Rs. 10 lakhs (£75,000) to re-condition certain types of wagons which, though nowhere near the end of their normal life, have proved uneconomical to run and maintain. Special provision is also made for promoting technical research in the Central Standards Office which is placed on a permanent basis. Including miscellaneous receipts of Rs. 75 lakhs, the net receipts will come up to Rs. 29½ crores, £22.3 million. Interest charges will be just under Rs. 31½ crores or say £23.8 million, and the final result will be a deficit of Rs. 190 lakhs, £1.4 million. The estimated deficit takes into account the loss of Rs. 197 lakhs on strategic railways. On commercial lines alone, therefore, the budget provides for a surplus of Rs. 7 lakhs, and is therefore balanced.

Works Programme for 1935-36

The programme of works expenditure for 1935-36, though more extensive than in the last few years, is still below the programme of pre-depression period. Of the 15½ crores budgeted for works expenditure, ¼ crore will be met by the utilisation of stores in hand, Rs. 9½ crores will be found from the depreciation fund and the balance of Rs. 5½ crores will be an addition to capital. A sum of Rs. 26 lakhs, £195,000 is provided for new construction, consisting of Rs. 8 lakhs for the completion of the Jhudo-Pithoro Railway already started, Rs. 8 lakhs for the construction of the Megna Bridge which will facilitate communications between Assam and Bengal, and Rs. 10 lakhs for a new railway 52 miles long in Southern India connecting Madura with Karai-kudi. This new line is likely to be remunerative and is recommended by the Government of Madras. Before the construction is finally decided upon, the Government of India will follow the procedure laid down by the Transport Advisory Council of referring the question to the Government of Madras for their advice in consultation with other local interests. A sum of Rs. 44 lakhs is provided for the purchase of the Amritsar-Patti-Kasur Railway, a line of 55 miles in the Punjab, owned by a private company, but worked by the N.W.R. This

outlay promises to give a return of 7½ per cent.

Open Line Works Including Rolling Stock

In the rolling stock programme, about 1½ crores or nearly £1 million are allowed for coaching stock and about 2½ crores say £1½ million for wagons. The purchase of over 5,000 wagons is contemplated. Other open line works include the electrification of 16 miles of the suburban section of the Bombay, Baroda & Central India Railway, from Borivli to Virar. Track renewals are estimated to cost Rs. 5 crores, bridgework Rs. 1 crore (= £750,000) and other structural works Rs. 3½ crores. Provision is also made for the expenditure in connection with the restoration of damages caused by the 1934 earthquake and with the protection works to the Hardinge Bridge.

SOUTH AFRICA

Buffalo River Bridge

The new combined road and railway bridge over the Buffalo River at East London was opened for road traffic on December 27 last. It is one of the largest works of its kind undertaken by the Railways and Harbours administration in recent years, and consists of three main 160-ft. double-deck spans—the 30 ft. road-cum-pathways deck being 20 ft. above the railway—nine 55 ft. road and five 55 ft. rail approach spans. Considerable difficulties were experienced in sinking the 14-ft. diameter concrete cylinders which support the main spans and are carried down to rock. The railway approach spans are carried on concrete piers and the road spans on columns. The railway is 35 ft. above low water level, and about 1,800 tons of steelwork were used in the bridge. A special effort was made to complete the roadway over the bridge in time for the first *Grand Prix* motor race in South Africa, which took place on the date of opening, the course being on the far side of the river from the town.

Springs—Nigel Construction

The new 21-mile line now under construction from Springs junction on the main line to Nigel will serve a rapidly developing area in the East Rand to the south of Springs. With the exception of a large cutting near that station, earthwork is now completed, as are also all the bridges. This cutting, which involves the excavation of 120,000 cu. yd. of earthwork, has given considerable trouble on account of slips due to heavy rain in November and December. A concrete retaining wall and lining to the catchwater drain are now being provided to prevent percolation and recurrence of slips. Other cuttings near Nigel are in rock and have given no trouble. Delay has been experienced in the supply of permanent way material—which is secondhand and being released by main line relaying—owing to the diversion

of labour from the relaying to combat the locust menace previously referred to in these columns.

FRANCE

Progress of Road-Rail Co-ordination Plans

Rail and road co-ordination plans in France are making progress, but several years must elapse before the proposed system can be applied to the whole country. The latest step in this direction is the acceptance by the Conseil d'Etat (State Council) of a project intended to serve as the basis of regional agreements concerning passenger traffic by rail and road. This project, drafted by the central co-ordination committee, was recently submitted to the Minister of Public Works and will shortly be published in the *Journal Officiel*.

The text of the project is in the form of a code laying down rules for the guidance of departmental and regional committees for the solution of co-ordination problems as they arise during the negotiations. Replacing of unprofitable railway working by motor-car transport is one of the most important questions. Regional committees must reach unanimous decisions. Otherwise the decision must be left to the central committee and eventually to the committee's arbiter. The general scheme of co-ordination must come into effect before December 31, 1940.

GERMANY

Reichsbahn General Meeting

After the election of the new President and Vice-President, the following business occupied the board of the German State Railway Company at its 65th ordinary meeting, held on February 22 and 23:—

Financial Position

The gross receipts for 1934 totalled about 3,300 million RM. as against 2,900 millions in 1933. The distribution was as follows:—

	1933 RM.	1934 RM.
Receipts:		
Passenger ...	846,000,000	916,000,000
Goods ...	1,815,000,000	2,140,000,000
Other ...	259,000,000	268,000,000
Total ...	2,920,000,000	3,324,000,000

The board also received an exhaustive report concerning subsidiary concerns and other undertakings in which it has an interest, including the Mittel-Europäisches Reisebüro (MER) (or Central European Travel Agency), the Reichsbahn-Zentrale für den Deutschen Reiseverkehr (or State Railway Bureaux for German Tourist Traffic). Special attention was given to the endeavours made to encourage foreign visitors to travel and to the general activities of the Mitropa.

The board then discussed the preliminary arrangement for the re-incor-

poration of the Saar lines into the Reichsbahn system. All matters concerning organisation, finance, rates and fares, staff and technical questions relating to the Saar lines were fully investigated.

Goods Train Acceleration

The State Railway recently inaugurated a new fast goods train service between Berlin, Hamm and Aachen, the time now taken being 24 hours less than formerly. This service is being linked up with the through international service from Czechoslovakia to Belgium, France, and Holland.

Reichsbahn Fare Payments

The State Railway announces that tickets purchased by foreign travellers in German ports or on board German ships must be paid for in foreign currency if the 60 per cent. reduction is to be secured, and that registered marks can no longer be accepted for this purpose. It is argued that otherwise travellers would enjoy the concession twice over.

VICTORIA

Greatest Flood Damage in the History of the Railways

Damage to railway tracks and bridges and consequent dislocation of train services were on an unprecedented scale in December last. Practically the whole of the Gippsland lines and some of the nearer-country and Melbourne suburban lines were seriously affected by surging flood waters. The worst damage occurred in the valley of the Latrobe, where continuous rain over the whole catchment of 1,300 square miles resulted in a rate of discharge sixteen times as great as any previously recorded. It was estimated that approximately £46,000 would be required to repair the damage. That sum represents nearly twice the Railway Department's total expenditure on flood repair work in all parts of the system during the past 10 years.

In spite of great difficulties in assembling gangs and landing necessary equipment at many places, due to the inundation and destruction of lines and roadways, the main Gippsland lines, with the exception of four bridges that had been seriously damaged, were made safe for the passage of trains within two days. Traffic on some of the branch lines in the district was not restored for over one week. Throughout the affected area, railway repair gangs carried out their emergency work in a manner which has won the admiration of the Commissioners and the public generally.

Smart Bridge Work

The most extensive damage was caused between Traralgon and Glenagarry, in eastern Victoria, where it was estimated that 25,000 cu. yd. of filling would be required to restore the ballast and banks washed away for a distance of about one mile. A considerable por-

tion of the Tarwin Bridge in the same area was also swept away by the flood waters. Pile driving and other equipment was rushed to the scene immediately the "up" section of the line was safe, and the bridge was ready for traffic in one week. Though at Nilma, in the south east, one span of the bridge and 90 ft. of an embankment 20 ft. high were washed away, a temporary bridge 110 ft. long, suitable for the passage of trains, was erected in 2½ days.

U.S.S.R.

Re-organisation of the Railways Foreshadowed

Responsible opinion in Russia points to the appointment of M. Kaganovich as Commissioner of Railways [as announced in THE RAILWAY GAZETTE of March 8.—Ed.] as prefacing the dawn of a new era for the railway systems of the Soviet Union. Fresh from his success in having completed the Moscow Underground, his reward is this new appointment, which insures that closer interest in railway affairs will in future be taken by the Communist authorities. They have come to realise that lack of railway progress for several years past has now left this all-important transport link in the chain of industry in such a state as to stultify the Five-Year and all other commercial-economic plans. General lack of organisation and discipline have been mainly responsible for the lagging of the railways behind other industries, it is alleged, but this important appointment is expected to bring new vigour and thrust into the administration of this key industry.

CHINA

Chintsekwang-Sian Railway

The Provincial Government of Shensi has prepared plans for the construction of a line 300 miles long to extend from Sian, the capital of Shensi, to Chintsekwang on the Shensi-Hupeh border, in compliance with an order of General Chiang Kai-shek. The estimated cost of the new line is \$1,500,000 (\$ about 1s. 6d.), and the Provincial Government of Shensi has requested financial assistance from the Generalissimo. This will form the nucleus of an entirely new north-south route, the farthest west in China if the French Yunnan line be excepted.

Through Traffic Arrangements

Through traffic arrangements for rail-borne and water-borne traffic have been made between Chinese railways and shipping companies engaged in coastal services. Passenger and freight through booking arrangements have been put in operation between the Kiaochow-Tsinan railway and the China Merchants' Steam Navigation Company and also between the Peking-Hankow railway and that steamer company.

RAILWAY MAINTENANCE PROBLEMS, III—FOUNDATIONS

By Lt.-Col. H. A. HULL, M.Inst.C.E., District Engineer, Northampton, L.N.W.R. & L.M.S.R., 1918-33

Notwithstanding all the knowledge now available in print, some of the most essential and elementary facts are often ignored. There are always pioneers at work, on whose heels follow those with ingenious minds to record their results as formulae for the future guidance of the unimaginative or timid.

THERE is no exact rule to guide the engineer in regard to foundations. Down to quite recent times the positions of bridges were usually selected where the designer would get the hardest foundation. Telford's choice for his suspension bridge over the Menai Strait was such an instance. With the advent of railways, however, structures had to be built where the course of the line dictated.

The foundations to carry permanent way have developed from solitary stone blocks to the present standard of crush stone or slag. A layer of clean sand beneath the ballast, especially where the formation is of clay, is to be recommended. Where clay works up through the ballast, thus making it difficult to maintain a good road, the trouble can be cured by taking out the impregnated ballast, excavating the clay formation to the extent of 9 in. or 1 ft., and filling in with clean sand. Of course, the drainage must be overhauled at the same time.

Neither "cracker dust" nor ashes are so effective, for these materials cake when wet, and, as they dry, crack, so that the clay works up through the cracks again. Incidentally the so-called "spent" ballast makes excellent metalling round the base of yard cranes, or on approach roads to carriage or dock landings.

Faulty foundations to buildings can usually be detected by the practised eye from the nature of cracks in the structure. That the cause of cracks is not always so revealed, however, may be instanced by the case of a new viaduct built to carry a widening over the River Anker just south of Tamworth. Shortly after the line was opened to traffic a crack began to show, starting at a joint in the stone copings on each side, and continuing down through the parapets, the spandrel walls, and through and across the arch itself. The arch was the one between the south abutment and the last pier. Having in mind trouble with the foundations of the original viaduct alongside, it was assumed that the crack in the new viaduct had a similar origin, and, as it began to develop rapidly, timber centres were erected under the arch, and longitudinal timbers laid under the running roads and carried through to the embankment beyond the abutment.

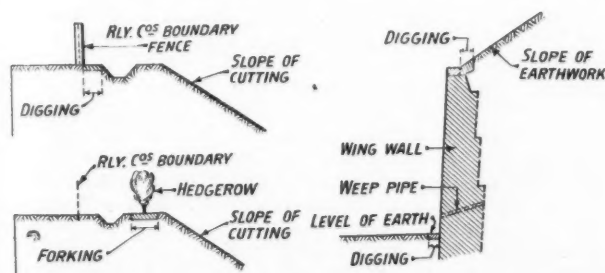
In the course of time the timbers decayed and called

for renewal, but the author, who was then in charge of the district, suspected that the real cause of the trouble was knocking at the nose of a crossing just over the crack in the arch. Permission having been obtained to shift the crossover off the viaduct, back on to the adjoining embankment, the timbers were removed, the road ballasted up, and the centres slightly slackened so that they were not actually touching the arch. At the same time the brickwork at the crack was made good and cement tallies attached to detect further movement. It is ten years since this was done and, no fresh developments having taken place, it is safe to conclude that a complete cure has been effected, and at little cost.

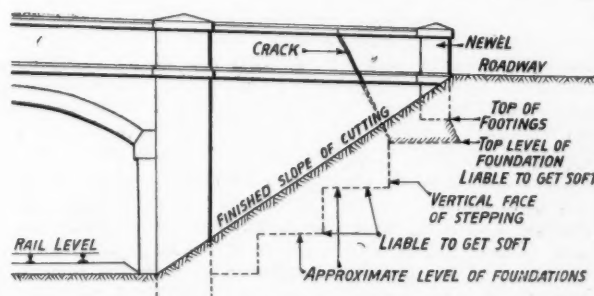
Wedge action brought about by vibration produced the effect of foundations giving way under another new viaduct on the same line south of Nuneaton. This was a single-line structure, built independently of the original viaduct, but actually touching the latter. Nothing wrong was noticed until 1908 when it was decided to widen the viaduct to take a second line. It was then found that the single line structure was leaning several inches out of plumb away from the original double line viaduct, as if the foundations under the abutments and piers had been giving way on the outside edge. Special precautions were therefore taken when excavating the foundations for the widening, and it was surprising to find, on getting down to the bottom of the existing work that the material was good hard clay which should not have given way at all.

Further examination to try to ascertain the cause of the trouble revealed the fact that ballast from the top had found an entrance between the original and the second viaduct, and, under the vibration of the traffic, had worked its way down like a wedge, forcing the narrower of the two structures over. This illustrates the tremendous power that wedge action, deriving its movement from vibration caused by traffic, can have, and it is therefore advisable to guard against such action.

There is a difference of opinion as to the necessity or otherwise of annually digging over the earthwork round fences, hedges and all structures for a foot wide, as shown in the sketch on left. Although for hedges and fences the practice is advisable, it should be avoided near structures the foundations of which are comparatively near the surface, as, for example, in the wing walls of bridges in cuttings, because surface water is thereby enabled to percolate to the shallow foundations. This has been the probable cause of cracks such as that shown on right; the bed below the footing becomes sodden and the foundation



Digging over earthworks. Avoid method on right

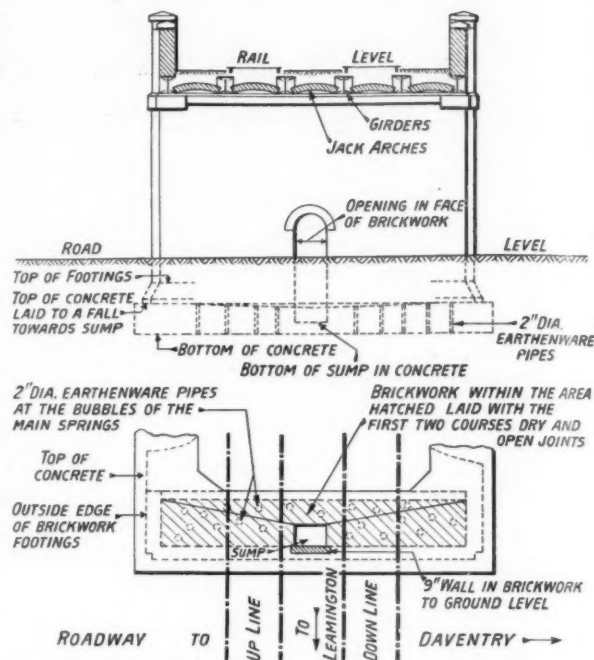


Result of digging near shallow foundations

under the newel gets frittered away in the course of time, silt finding its way to a lower level by way of the vertical face of the stepping. The void thus made causes a cantilever action and a resultant crack through the wing and parapet.

An interesting case of water in a foundation occurred on the Daventry and Leamington line when it was being constructed. A spring was discovered during the excavation for the foundation of a bridge abutment at a time when any delay in the progress of the work, which was being done under contract, might lead to financial difficulties. It was essential not to dam up the spring, as it was the source of water supply to some neighbouring cottages. As the excavation for the foundation, which was in blue clay, proceeded downwards, the spring showed itself by small bubbles rising up over the surface. The expedient illustrated herewith and devised on the spot proved successful. Land drains, 2 in. diameter, which happened to be handy, were set upright above all the largest bubbles rising through the clay; the concreting was then begun and, as it reached the top of the pipes, straw stoppers were inserted into them to keep them clear. The top of the concrete was laid to a fall towards a sump formed in the centre of the abutment face. The first two courses of brickwork were laid dry with slightly open joints. A small opening, large enough to draw the spring water off, was made in the abutment face, and the water supply was thus preserved.

It is very important that the foundations of bridges over water courses where there is any considerable flow should be periodically examined by a competent diver. On the Blisworth and Peterborough line, where, in the course of 46 miles, the River Nene is crossed as many times, it was found necessary to have this examination carried out every seven years. It was nearly always found necessary to undertake considerable repairs below the water caused by the scour. Lead wool proved to be the most efficacious material for making good the defects in the joints, and



Method of dealing with a spring encountered in digging foundation for a bridge abutment

stockings of dry concrete for repairing the places in the foundations where the scour had worked underneath the structure itself.

We hope to publish the next article in this series in our issue dated April 12. Previous articles appeared in our January 18 and February 15 issues.

MORE EXPRESS PASSENGER BEYER-GARRATTS FOR ALGERIA

Following extensive tests over two years, the Algerian Railways have now ordered twelve 4-6-2 + 2-6-4 Beyer-Garratt locomotives for speeds up to 80 m.p.h. on heavily-graded lines

IN our issue of August 5, 1932, we described a 4-6-2 + 2-6-4 type express passenger Beyer-Garratt locomotive designed by Beyer, Peacock & Co. Ltd., and built in France by the Société Franco-Belge de Matériel de Chemins de Fer, for the Algerian Railways (Paris, Lyons & Mediterranean Section), and in our issues of September 29, 1933, and November 9, 1934, we referred to alterations carried out with this locomotive, during the two years it has been in service. The most important of these experiments was the substitution of the Cossart system of cam-operated piston valves for the ordinary piston valve and Walschaert gear with which the engine was delivered. Others included modification to the blast pipe arrangement. The locomotive has now been pronounced a success by the French authorities, and latterly tests have been conducted on the State Section of the Algerian Railways, with the result that the decision has been made to operate the heavy express passenger services not only over the Algiers-Oran section but over the Algiers-Constantine section with locomotives of this type, and, as announced in our Contracts and Tenders Section in this issue, an order for twelve Beyer-Garratt locomotives has

been placed with the Société Franco-Belge de Matériel de Chemins de Fer. The original engine, as mentioned above, was designed by Beyer, Peacock & Co. Ltd. and the twelve now ordered will be manufactured in close collaboration with this firm.

Certain improvements will be embodied in the new engines, based on experience gained with the trial engine, and the tractive effort of the new engines by formula now works out at 60,000 lb. at 75 per cent. boiler pressure. As before, the wheel arrangement will be 4-6-2 + 2-6-4 but the boiler pressure will be raised from 227 to 290 lb. per sq. in. (20 hectopièzes), and Cossart valve gear electrically controlled from the cab, with a luminous repeater device, will be fitted. A very high superheat (giving as nearly as possible a continuous temperature of 750° F.) will also be a feature, and the smokebox arrangement will include a double blast pipe with adjustable nozzles. The front water tank will be cylindrical to give aerodynamic advantages and smoke screens will also be fitted. A feed water heater will also be fitted, of a type to be decided.

The following table compares the characteristics of

the original and the new batch of locomotives as far as information is available at the moment:—

	Original Engine	New Engines
Coupled wheels, diam. ..	5 ft. 10½ in.	5 ft. 10½ in.
Boiler pressure ..	227.5 lb. per sq. in.	290 lb. per sq. in.
Grate area ..	54.6 sq. ft.	54.6 sq. ft.
Maximum axleload ..	18.2 tons	18.2 tons
Tractive effort, at 75 per cent. b.p.	47,360 lb.	60,000 lb.

The locomotive will be tested on the Northern Railway of France prior to shipment to Algeria. The whole engine will be designed with a view to the economical running

at early cut-offs and long expansion at high speeds, and the utilisation of the boiler power to the limits of adhesion at low speeds. The boiler horse power is estimated at over 3,000 according to the formula of the Office Central d'Etudes de Matériel de Chemins de Fer (O.C.E.M.) The locomotive must be capable of 80 m.p.h. and must have perfect stability on 200 metre curves at 31 m.p.h. and must also be capable of maintaining high average speeds up the long 1 in 50 and 1 in 40 gradients. All these conditions of speed and stability have been more than met throughout the long trials, special tests with the Hallade apparatus, &c., having conclusively proved the perfect riding properties of the locomotive.

FURTHER DETAILS OF THE L.N.E.R. RECORD RUN

Including a dynamometer car speed diagram with frequent boiler pressures, steam chest pressures and cut-offs and figures of the coal consumption for the round trip

IN our last issue we published, on pages 466-7, details of the record breaking run accomplished by the L.N.E.R. special train headed by 4-6-2 locomotive, No. 275, *Papyrus*, on March 5, together with a complete log of the round trip King's Cross-Newcastle-King's Cross. Also on page 509 of this issue we illustrate this engine and give a brief general description and dimensions of the class to which it belongs, as well as a tribute to the superb handling of *Papyrus* by the crews concerned.

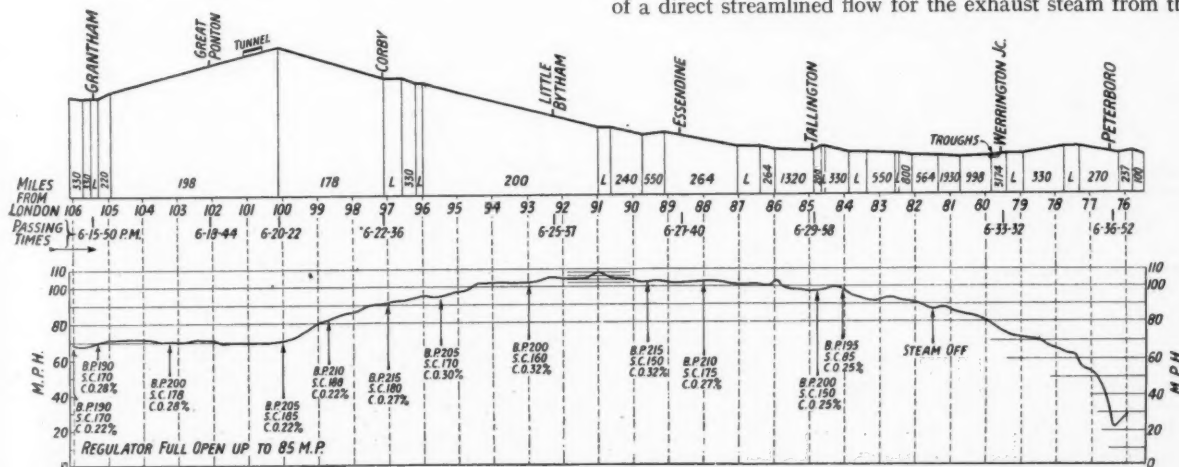
Last week the total weight hauled on this run was given as 209½ tons empty and 213 tons including passengers, staff and stores, but figures which have now been received from the L.N.E.R. show that the weight empty was 213 tons 12 cwt. behind the tender, so that the weight loaded was actually about 216½ tons. The formation and weight of the train was:—

	Tons	Cwt.
Engine and tender	158	13 in working order
Dynamometer car	32	17
Corridor first, No. 1131 ..	35	7
First diner, No. 43041 ..	43	17
First, No. 4231	33	7
First, No. 441	34	15
First brake, No. 43177 ..	33	9
Passengers, staff and stores ..	3	5
Total weight of train ..	375	10

In connection with the log and description of the run already published, as referred to above, it is necessary to add only that no attempt was made to improve upon the booked times on the down journey, and yet, in spite of the brief signal stop near Arksey and the service speed restrictions, many of which are severe, the start to stop speed from King's Cross to Newcastle was 68 m.p.h.

On the return run similar conditions were observed, except that between Grantham and Peterborough Driver Sparshatt was given an opportunity of showing what the engine could do, and, as a result, remarkable speeds were attained as recorded by us last week. We are however, now able to publish a speed diagram of this section of the up run, compiled from the automatic record of the dynamometer car, with the boiler pressures, steam chest pressures and cut-offs marked on it at frequent intervals. A gradient profile is reproduced above the diagram for ready reference. It will be noticed that the 108 m.p.h. maximum speed was attained with a 32 per cent. cut-off and fully opened regulator.

It is always more difficult to get rid of the exhaust steam freely when running at high speeds, than to provide for the admission of live steam to the cylinders, and many engines are unable to attain extra high speeds for this reason. So that, when designing this Pacific type of engine, special consideration was given to the provision of a direct streamlined flow for the exhaust steam from the



Gradient profile and dynamometer car speed curve for Grantham-Peterborough section of record run on March 5

cylinders to the blast pipe nozzle. Consequently it was possible to run at a speed of over 100 m.p.h. with a cut-off as late as 32 per cent. without the exhaust being choked in any way. It is also notable that the piston valves have a diameter of only 8 in., which is generally regarded as small for 19-in. cylinders, but this did not detract from the free running.

The coal used on the round journey is given below:—

Coal consumption	Tons Cwt.
Coal issued at King's Cross prior to working the down trip	9 5
Coal issued at Gateshead prior to working the return trip	5 0
	14 5
Coal remaining on tender when the engine returned to King's Cross	3 10
Consumption, King's Cross to Newcastle and back, 536 miles	10 15
= 44.93 lb. per mile, including lighting up.	

Class of coal supplied: South Yorkshire.

The speed record in the dynamometer car is obtained by means of two-second time intervals, marked on a paper roll travelling at 1 ft. to the mile, which is more accurate than any instrument drawing a speed curve. The speeds were ascertained at ten-second intervals, and plotted on the chart, a section of which we reproduce.

An Analysis of the Speed Records

Further examination of the times achieved on the runs reveals the fact that several records of a notable description were achieved. They were as follow:—

(a) From King's Cross to Newcastle and back, 536.6 miles, was run in 237 min. 7 sec. down and 231 min. 48 sec. up—a total of 468 min. 55 sec. If allowance be made for the out-of-course signal stop and slowing at Arksey, due to the derailment of some wagons on the up road, the net time comes down to 457½ min., and the net average speed for 536.6 miles works out at 70.4 m.p.h., inclusive of starting and stopping in both directions, and all ordinary service slacks.

(b) Deducting the portion of the journey through the Durham mining area, where speed had to be moderated almost throughout, the distance from King's Cross to Croxdale, 250.1 miles, was covered in 215 min. 36 sec., and from Croxdale to King's Cross in 208 min. 21 sec., a total of 423 min. 57 sec. With the same allowance as before for the Arksey delays, the aggregate net time is 412½ min., which gives a net average of 73.0 m.p.h. for 500.2 miles.

(c) A summary of the fastest stretches gives the following results:—

DOWN JOURNEY			
	Miles	Min.	Sec.
Hatfield to mile-post 21	3.3	2	39
Knebworth to Fletton Junction	50.0	37	7
Barkstone to Newark	10.4	7	54
Shaftholme Junction to Brayton Junction	12.8	9	34
Riccall to Naburn	5.5	4	9
York (mile-post 3) to mile-post 42	39.0	29	14
	121.0	90	37
UP JOURNEY			
	Miles	Min.	Sec.
Ferryhill Junction to Poppleton Junction	55.4	41	28
Black Carr Junction to Retford	14.6	11	12
Markham Box to Claypole	18.3	14	41
Stoke Box to Werrington Junction	20.6	13	10
Yaxley to Finsbury Park	70.1	53	40
	179.0	134	11

This gives a total of precisely 300 miles covered in 224 min. 48 sec., and works out at an average speed of 80.07 m.p.h. for 300 miles, or 50 miles more than the aggregate figure at this speed achieved on the runs from London to Leeds and back on November last. Nothing approaching either of these aggregate mileages at 80 m.p.h. has ever been achieved previously in a single day by any other steam locomotive.

(d) A total of 12.3 miles covered at an average speed of 100.6 m.p.h. Many claims have been made in various parts of the world, and particularly America, to extremely high speeds over short distances, and enquiry has proved them to have been timed merely with an ordinary watch to the nearest minute, between a couple of stations only two or three miles apart, with a wide margin of error which would obviously make it impossible to accept such figures as authentic records. But no serious claim has been made previously to an average speed of over 100 m.p.h. sustained for a distance of over 12 miles.

(e) As regards fully authenticated records, with the check of station-to-station speeds and of the continuous speed curve obtained in the dynamometer car—as reproduced—the maximum of 108 m.p.h. exceeds any figure previously obtained with steam.

Summarised, therefore, the aggregate figures for the day were:—

536.6 miles at 70.4 m.p.h.
500.2 miles at 73.0 m.p.h.
300.0 miles at 80.1 m.p.h.
12.3 miles at 100.6 m.p.h.

all of which may with certainty be regarded as world records for steam traction.

Other details of the performance which are of exceptional note are the minimum speed on the up journey of 78½ m.p.h. at Stevenage, and the maintained speed of between 79 and 78½ m.p.h. up the whole of the 3.4 miles at 1 in 200 extending from Hitchin to Stevenage with a trailing load of 216 tons, particularly as the locomotive had by then covered over 500 miles at very high speed throughout; the average of 76.3 m.p.h. up the 13-mile ascent from mile-post 87 to Stoke Summit on the down journey; the acceleration from a walking pace at Arksey, on the down journey, to 85 m.p.h. in no more than 8 miles of level track.

The Track and Abnormal Speeds

No part of the L.N.E.R. main line is superelevated for 100 m.p.h. speeds, but over the section where this speed was attained, there is very little curvature, and such curves as exist are of long radius. As mentioned in the last issue, the riding of the rolling stock at this high speed was unexceptionably smooth. The only portions of the journey where the effects of curvature were felt to some degree were at points where the speeds were very far higher than those normally run, as, for example, over Stoke Summit on the northbound journey and immediately beyond, where the speed was 75 m.p.h.* at a point where the normal minimum speed is about 45 m.p.h. Generally speaking, however, the sensations in the train were not such as would suggest the necessity of any extensive alterations to track superelevation were the speeds necessary to a 4-hr. schedule between London and Newcastle to become common.

We have to thank Mr. H. N. Gresley, the Chief Mechanical Engineer of the L.N.E.R., and the officers under him, for the details from which the diagram on page 501 was prepared, and for particulars of coal consumption.

(See editorial article on page 493)

* On the special run between King's Cross and Leeds, on November 30 last, the speed at this point was over 80 m.p.h.—Ed., R.G.

RAILWAYS AND ROAD TRANSPORT SECTION

This section appears at four-weekly intervals

Railway Shareholdings in Road Transport

THE annual reports for the year ended December 31, 1934, of the four main-line railways disclose that there have been several changes in the amounts invested in road transport undertakings, apart from the investments in Carter, Paterson & Co., and Hay's Wharf Cartage Co. Ltd. With regard to passenger road transport, the sums invested in associated bus undertakings, and the earnings in 1934, amount to:—

	Investment			Earnings 1934		
	£	s.	d.	£	s.	d.
L.M.S.R.	2,916,012	17	0	230,196	14	10
L.N.E.R.	2,434,772	3	6	187,550	4	9
G.W.R.	2,102,815	13	7	121,570	6	3
S.R.	1,400,844	13	3	—	—	—

The investments represent the amount of cash spent on the holdings and therefore do not agree with the totals of the holdings shown in the accompanying table, as

some shares have been purchased at other than their par value. The biggest change in the totals is seen in the case of the Southern Railway, whose investment has been reduced by £412,791, bringing it back close to the figure of £1,390,802 at which it stood in 1932. The augmentation in the intervening year presumably may be accounted for by the acquisition of certain bus and coach interests which have since been disposed of to associated companies.

The L.M.S.R. showed a net increase of £5,235, but examination of the list reveals that, while the investment in the Scottish Motor Traction Company was increased by £47,446, that in Crosville Motor Services was reduced by £42,344. The total investment of the L.N.E.R. was increased by £48,014, practically all of which was accounted for by the purchase of an increased holding in the Scottish Motor Traction Co. Ltd. The G.W.R. total shows a reduction of £60,209, and it may be noted that the subscription to the Western National Omnibus Co. Ltd. has been reduced by £110,000 through the sale of

Associated Company	Issued Share Capital	L.N.E.R.		L.M.S.R.		G.W.R.		S.R.
		Holding	Earnings	Holding	Earnings	Holding	Earnings	
		£	£ s. d.	£	£ s. d.	£	£ s. d.	£
Aldershot & District Traction Co. Ltd.	200,000 Ord.	—	—	—	—	—	—	—
W. Alexander & Sons Ltd.	200,000 Ord.	50,000	25,000 0 0	50,000	25,000 0 0	—	—	—
Birmingham & Midland Motor Omnibus Co. Ltd.	700,000 6% Part. Pref.	175,000	—	175,000	—	—	—	—
City of Oxford Motor Services Limited	1,000,000 Ord.	—	—	300,000	48,000 0 0	200,000	32,000 0 0	—
Crosville Motor Services Limited	100,000 8% Cum. Pref.	—	—	—	—	70,875	11,550 3 3	—
Cumberland Motor Services Limited	141,750 Ord.	—	—	—	—	37,000	—	—
Devon General Omnibus & Touring Co. Ltd.	74,000 6½% Cum. Pref.	—	—	357,724	22,731 14 5	119,241	5,886 3 7	—
Eastern Counties Omnibus Co. Ltd.	955,000 Ord.	—	—	41,666	4,166 12 0	40,917	3,600 0 0	—
Eastern National Omnibus Co. Ltd.	125,000 Ord.	—	—	—	—	—	—	—
East Kent Road Car Co. Ltd.	200,000 7% Cum. Pref.	—	—	—	—	—	—	—
East Midland Motor Services Limited	672,069 Ord.	163,243	8,162 3 0	22,419	1,120 19 0	—	—	—
East Yorkshire Motor Services Limited	200,000 5% Cum. Red.	—	—	—	—	—	—	—
Hants & Dorset Motor Services Limited	250,000 Ord.	62,500	11,750 0 0	62,500	11,750 0 0	—	—	—
Hebble Motor Services Limited	350,000 6% Cum. Pref.	112,500	—	112,500	—	—	—	—
Highland Transport Co. Ltd.	350,000 Ord.	—	—	—	—	—	—	—
Lincolnshire Road Car Co. Ltd.	200,000 6½% Cum. Pref.	—	—	—	—	—	—	—
Maidstone & District Motor Services Limited	100,000 Ord.	33,333	3,333 6 0	16,667	1,666 14 0	—	—	—
Northern General Transport Co. Ltd.	200,000 Ord.	99,575	9,957 10 0	—	—	—	—	—
North Western Road Car Co. Ltd.	320,000 Ord.	—	—	—	—	—	—	—
Ribble Motor Services Limited	150,000 6½% Cum. Pref.	—	—	—	—	—	—	—
Scottish Motor Traction Co. Ltd.	100,000 Ord.	12,500	1,250 0 0	37,500	3,750 0 0	—	—	—
Southern National Omnibus Co. Ltd.	35,000 Ord.	—	—	17,500	—	—	—	—
Southern Vectis Omnibus Co. Ltd.	100,000 Ord.	31,961	3,173 15 3	7,991	793 9 9	—	—	—
Thames Valley Traction Co. Ltd.	400,000 Ord.	—	—	—	—	—	—	—
Trent Motor Traction Co. Ltd.	200,000 6½% Cum. Pref.	—	—	—	—	—	—	—
United Automobile Services Limited	554,053 Ord.	243,815	25,236 14 2	—	—	—	—	—
Western National Omnibus Co. Ltd.	300,000 6½% Cum. Pref.	13,157	—	—	—	—	—	—
Western Welsh Omnibus Co. Ltd.	600,000 Ord.	99,555	13,688 16 6	199,110	27,377 13 0	—	—	—
West Yorkshire Road Car Co. Ltd.	200,000 6½% Cum. Pref.	—	—	264,082	26,408 4 0	—	—	—
Wilts & Dorset Motor Services Limited	746,690 Ord.	214,609	26,953 10 1	214,608	26,952 13 9	—	—	—
Yorkshire (Woollen District) Electric Tramways Limited	1,000,000 6½% Cum. Pref.	106,862	—	106,863	—	—	—	—
	426,250 Ord.	—	—	—	—	—	—	—
	350,000 Ord.	—	—	—	—	—	—	—
	96,500 6% Cum. Pref.	—	—	—	—	—	—	—
	55,000 Ord.	—	—	—	—	—	—	—
	15,200 6% Cum. Pref.	—	—	—	—	—	—	—
	150,000 Ord.	—	—	—	—	51,115	2,555 15 0	—
	268,000 Ord.	36,845	3,684 10 0	73,689	7,368 18 1	—	—	—
	875,000 Ord.	428,334	36,853 11 5	—	—	—	—	—
	150,000 7% Cum. Pref.	36,955	—	—	—	—	—	—
	567,152 Ord.	—	—	—	—	283,576	55,103 4 5	—
	1,228,980 6% Cum. Pref.	—	—	—	—	843,387	10,875 0 0	—
	230,000 Ord.	—	—	—	—	145,000	—	—
	450,000 Ord.	111,909	9,325 14 0	111,909	9,325 16 0	—	—	—
	200,000 6½% Pref.	—	—	—	—	—	—	—
	60,000 Ord.	—	—	—	—	—	—	—
	200,000 Ord.	49,042	4,617 7 4	49,042	4,617 7 10	—	—	—
	24,350 7% Pref.	4,661	—	4,662	—	—	—	—
	330,000 Ord.	55,000	4,583 7 0	110,000	9,166 13 0	—	—	—

* The Southern Railway investments in passenger road transport undertakings are not charged to capital account and so do not appear in detail in the annual accounts. In most cases the Southern Railway holds approximately 30 per cent. of the issued share capital, but the holding is about 50 per cent. in the cases of the Southern National and Southern Vectis companies, and about 20 per cent. in the case of the Devon General, where the G.W.R. holds about 30 per cent.

cumulative preference shares. The investment in Crosville Motor Services has been increased by £42,345 and that in the Devon General Company by £7,445.

So far reference has been made only to the cash invested by the various companies in the associated road concerns. There have been other changes in the share holdings, in several cases due to the issue of bonus shares. The shares held by the L.M.S.R. in the Crosville company were reduced by 42,276, but increases included those in Lincolnshire Road Car, 64; North Western Road Car, 49,778; Scottish Motor Traction, 27,936; West Yorkshire Road Car, 37,302; Yorkshire Traction, 12,263; Yorkshire (Woollen District) Electric Tramways, 36,667. In a number of cases the L.N.E.R. holding was similarly increased, that in the Scottish Motor Traction by 27,935, West Yorkshire by 37,304, Yorkshire Traction by 12,262. In the case of the Yorkshire (Woollen District) Tramways, the increase was 18,333 and in Lincolnshire Road Car, 254, while the holding in United Automobile Services was increased by 85,708 shares. The G.W.R. holding in Crosville Motor Services has been increased by 42,276, corresponding to the L.M.S.R. reduction. There is an increase of 4,917 in the Devon General shares, while 100,000 cumulative preference shares in the Western National Company have been disposed of.

Each of the four grouped railways has a holding of

126,502 ordinary and 91,250 6 per cent. cumulative preference shares in Carter, Paterson & Co. Ltd., and 52,927 ordinary shares in Hay's Wharf Cartage Co. Ltd. (controlling Pickfords Limited), but the holdings of the 6 per cent. cumulative preference shares in the latter concern vary slightly, as follow: L.M.S.R., 33,160; L.N.E.R., 32,910; G.W.R., 32,977; S.R., 32,910. The dividends on the Carter, Paterson investments are shown as £16,860 3s. 6d. in the case of the L.N.E.R., and the S.R., £16,860 3s. 7d. for L.M.S.R. and £16,860 3s. 8d. for G.W.R. The Hay's Wharf investments produced the following returns: L.M.S.R., £7,282 6s.; L.N.E.R., £7,267 6s.; G.W.R., £7,271 6s. 6d.; S.R., £7,267 6s. The cost of these investments is shown as follows: L.M.S.R., £545,978 15s. 9d.; L.N.E.R., £545,726 5s. 9d.; G.W.R., £545,794 0s. 9d.; S.R., £545,726 5s. 9d.

The L.M.S.R. has also £71,761 invested in Joseph Nall & Co. Ltd., representing a holding of 35,106 £1 B ordinary shares and 10,000 £1 5 per cent. cumulative preference shares, an investment that produced a return of £500 in 1934. The company has also £100,000 in £1 B ordinary shares in Wordie & Co. Ltd., and this produced a return of £4,000. The L.N.E.R. has invested £84,808 4s. 1d. in Currie & Co. (Newcastle) Ltd., representing 63,750 ordinary shares, and this produced £4,143 15s. last year.

A LONG DISTANCE SERVICE IN U.S.—One of the most important developments in long distance road services in the United States was inaugurated on the last day of 1934 when the Burlington Transportation Company, a road subsidiary of the Chicago, Burlington & Quincy Railroad Company, began the operation of a through service between Chicago and Los Angeles, working on a 71-hour schedule. For the first fortnight the service was run daily between Chicago and Omaha with a service three times a week between Omaha and Los Angeles, but since additional vehicles have been delivered the service has been made a daily one throughout.

TRAILERS ON U.S. RAILWAY.—Quite an extensive business is now being done by the Chicago, Rock Island & Pacific Railroad in the transport of semi-trailers, belonging to cartage companies, across the State. The regular services are between Chicago and Peoria and Chicago and East Moline. At each of those three places docks have been constructed with ramps so that the trailers can be run on and off the flat railtrucks by the tractors which haul them along the highway. Trains of about 16 trucks are being sent off each night and they arrive at their destination by 5.30 a.m. It is stated that this scheme will bring the railroad about \$200,000 a year gross.



The model of the "Flying Scotsman" engine and tender which has been on exhibition at Leeds New station for some months was recently carted by the L.N.E.R. to the Golden Acre amusement park where it is being used to haul light railway trains. The engine weighs 10 tons and the tender 2 tons and, mounted on two trailers, they were hauled by two L.N.E.R. tractors. At the park a bridge had to be built so that the engine could be run off the trailer on to its rails

Thornycrofts for Brazil

A number of Thornycroft Stag type vehicles has recently been ordered by the San Paulo Railway Company. They are designed for long-distance running with loads up to 12 tons

TO the fleet of fifty or so Thornycroft freight and passenger vehicles operated in Brazil, the San Paulo Railway Company has recently added some of the latest Stag class 12-ton rigid six-wheeled lorries, built by John I. Thornycroft & Co. Ltd., one of which is shown in our illustration. These are fitted with the 100 h.p. Thornycroft six cylinder petrol engine or, if desired, the Thornycroft oil engine of similar power may be installed.

One of the outstanding features of the chassis is that the forward control enables the large loading space of 23 ft. 10 in. to be arranged for. There is also the fact that while the construction is quite robust, it is yet com-

arranged on both tappets and cams to reduce wear to the minimum and they are easily reached through two large covers on the side of the cylinder block. The attention given to the matter of accessibility is likewise seen in the easy way in which the bottom half of the crankcase may be detached for the inspection and taking-up of the main and big-end bearings.

Made of alloy steel, the crankshaft is dynamically and statically balanced and carried in seven large white metal lined bearings while an efficient vibration damper assists the smooth running over the whole speed range. Ignition is by high-tension, automatic advance magneto and the



One of the Thornycroft Stag 12-tonners being supplied to the San Paulo Railway Company for service in Brazil

paratively light in unladen weight due to the employment of the latest metals, including aluminium alloys. There is also the bogie axle construction, with the foremost axle taking the drive and the third axle being a trailing one only, the triple servo-assisted brakes and the twin 50 gallon fuel tanks to allow of long distances being covered without refuelling.

The six-cylinder petrol engine with a bore of 111 mm. and a stroke of 133 mm. has a capacity of 474 cubic inches (7.750 c.c.) with 45.9 R.A.C. rating. It is suspended at three points in the chassis on rubber insulated brackets to secure a cushioning effect in the transmission of the torque reaction from the engine to the frame while any distortion of the frame is prevented from affecting the crankcase. The cylinders form a monobloc casting, fitted with wet liners and an easily detachable head. The valves are overhead, operated by pushrods and adjustable rockers from a single camshaft, housed in the crankcase and driven from the front of the engine by a triplex chain with an adjusting device. Large working faces have been

float-feed carburettor has a starting jet as well as a pilot jet for slow running and a hot spot is arranged in the inlet manifold.

The system of forced lubrication allows for adequate filtration. From an efficient external filter which can be cleaned without loss of lubricant or the necessity to drain the sump, the oil passes to the main and connecting rod bearings as well as to the camshaft and camshaft thrust bearing. It is also fed to the overhead valve gear, under reduced pressure, through the hollow rocker shaft. Ribs cast on the filter and sump help to keep the oil cool and the sump may be drained by unscrewing a nut on the side of the engine without crawling under the chassis.

The transmission system includes a single dry plate clutch with specially prepared fabric surfaces, and gear-changing is facilitated by the lightness of the driven member combined with an efficient stop. There is a four speed gearbox, with a top direct drive, the other ratios being 1.52, 2.40, and 4.50 to one, and an auxiliary gearbox, mounted as a separate unit in the transmission line.

gives an additional reduction of 1.5, this being brought into operation by a separate lever in the driver's cab. The drive is transmitted by a hollow propeller shaft to the full-floating overhead worm-driven axle in which the reduction ratio is 8.75, with an alternative ratio of 9.25 available if required.

The rear suspension comprises four inverted semi-elliptic springs independently pivoted at their centres to brackets rigidly attached to the chassis frame and permitting an even distribution of weight on all four wheels of the bogie under all conditions. This suspension permits a 6 in. difference in bogie levels, with buffers on the axles to prevent excessive movement.

There are internal expanding brakes on all six wheels. The foot system is assisted by three vacuum servo cylinders, two being directly connected to the brakes on the front wheels. All the brake gear is easily adjustable and the brakes are enclosed by dust covers. The lubrication of the chassis is effected by oil-gun and grease-gun from nipples grouped in accessible positions. The weight of the chassis with 42 in. by 9 in. tyres on the front wheels and 13.50 in. by 26 in. low pressure tyres on the back wheels, and with front wings, battery, standard lamps and dynamo, minimum oil in engine, gearbox and back axle but without petrol, water, tools and spare wheel, is given as 5 tons 8 cwt. (12,100 lb.).

A Four-Wheeled Tractor for Semi-Trailers

The utility of the Karrier Bantam type of vehicle has been well tested in the localised transport field and it has now been produced as a four-wheeled tractor for semi-trailer work

AS a vehicle for two-ton loads the Bantam type of chassis, built by Karrier Motors Successors Limited, has proved very successful in collection and delivery work, partly because of its remarkable manoeuvrability, being able to turn in a 30 ft. circle, and partly because it is possible to arrange for bodywork with a floor level, unbroken by wheel arches, &c., as low as 2 ft. 6 in. from the ground. By placing the four cylinder power unit well forward in the chassis body, space in the neighbourhood of 12 ft. is available, sufficing for all needs.

So far, the Karrier Bantam has been employed as a load carrier, but present-day demands for the semi-trailer type of freight-carrying vehicle have led to the marketing of the Bantam as a tractor for operating in conjunction with super-imposed trailers, either of the fixed or quickly-detachable types. In our illustration one of these is seen with a six-ton semi-trailer fitted with the Principality type of moving floor.

As a tractor the Bantam has a 6 ft. wheelbase instead

of the normal 7 ft. 10½ in., but in other respects the specification is standard and includes the 14-44 h.p. four cylinder engine, four speed gearbox, a straight welded frame and 25 in. by 6 in. pneumatic tyres. It is equipped with the Karrier patent trailer coupling and brake gear, which allows instantaneous coupling and uncoupling of the trailer portion without requiring the driver to leave his seat at the wheel and which also permits the tractor to be fully employed with any number of trailer units. The trailer has a body 14 ft. long by 7 ft. wide and the main frame, of 7 in. channel steel, is carried on 32 in. by 6 in. heavy duty twin pneumatics at the rear. The usual small solid-tyred wheels at the front support the trailer when detached and also allow it to be man-handled should the necessity arise for movement.

It will be noticed that the driver sits in a cabin that provides complete protection from the weather and, moreover, it is designed to allow exceptionally easy access and exit from either side, without any climbing to do.



One of the new Karrier Bantam tractors with a semi-trailer fitted with a moving floor of the Principality type, for two-ton loads

Road and Rail in Ireland

THE annual reports of the railways in the Irish Free State show that very close attention is being given to the matter of utilising road services to assist the railways in providing efficient transport. At the commencement of last year the Irish Omnibus Co. Ltd. and John Wallis & Sons Ltd., which had been controlled by the Great Southern Railways Company, were merged in that concern, and the accounts for the year show that the gross receipts from road transport amounted in twelve months to £704,778, while the expenditure was £624,384, so that there was a net receipt of £80,394 on this account. A table in the accounts shows that the company owns 235 road motors for goods and parcels, 392 horse wagons and carts, 235 horses, and 263 buses, whereas in the previous year it only owned 4 buses. The receipts from the passenger services included £436,024 18s. 6d. from fares, £27,380 18s. 7d. from other sources, and £36,273 0s. 11d. from hire of vehicles. The receipts from goods services were £197,659 16s. 3d. plus £7,439 17s. miscellaneous receipts.

On the expenditure side there is the item of £85,078 16s. 8d. for maintenance of motor vehicles and £34,082 9s. 2d. for licence duty, and there is also an item of £21,957 19s. 1d. for maintenance of motors in the account of expenses of collection and delivery of parcels and goods. The road transport account includes the transfer of £67,494 3s. 3d. to a renewal account.

The directors' report states that in pursuance of the powers granted by the Road Transport Act, 1933, the Great Southern Railways Company is acquiring road transport concerns operating in the area served by its system. During the year 1934 a number of such undertakings was acquired and negotiations are in progress for further purchases.

The directors of the Great Northern Railway Company (Ireland) in their annual report state that the legislation in the I.F.S. has largely succeeded in its object of reducing the uneconomic road passenger competition in the area served by the company, and steps are being taken to acquire a number of road lorry undertakings with a view to further co-ordination of road and rail services and the elimination of wasteful duplication. They add that there

was no diminution of the unrestricted and uneconomic road services in Northern Ireland and record the decision of the Government to give legislative effect to the main proposals in Sir Felix Pole's report on the matter.

This company owns 96 parcels and goods vehicles and 171 buses; it only keeps one horse for shunting work. The receipts of the road passenger services totalled £191,032 3s., including £180,669 16s. 8d. from fares and £2,675 19s. 6d. from hire of vehicles. The expenditure was £199,349 13s., including £46,067 18s. for maintenance of vehicles, £14,233 3s. 8d. for licence duty and £27,612 18s. 2d. transferred to a renewal account. The maintenance of motor vehicles for collection and delivery of parcels and goods is given as £22,232 13s. 6d.

The Londonderry & Lough Swilly Railway Company, which operates bus services in Co. Donegal, reports that its receipts from this source increased from £38,435 to £38,956 during 1934. The expenditure was heavier, however, at £35,716 13s. 11d. and the balance was £3,239 11s. 3d. Two additional 35-seater buses were placed in service during the year and the bus routes in the western direction were extended up to Gweedore. At the end of the year the company owned 36 buses and 4 road motors for goods and parcels. Items on the expenditure side included: maintenance of vehicles, £6,299 17s. 7d.; licences, £2,467 3s. 3d., and depreciation, £6,779. At the annual meeting the Chairman, Mr. I. J. Trew Colquhoun, said that the road passenger services presented a bright side to their accounts. The increase in the receipts arose mainly from the fact that the company had developed tourist and excursion traffic by road, and it was going to continue to develop this traffic.

The Belfast & County Down Railway Company owns 14 buses and eight goods and freight motor vehicles; two old buses were replaced by two Dennis vehicles and two steam wagons were replaced by three Morris-Commercials. The passenger services produced £17,410 4s. 1d. and a profit is shown of £1,218 1s. 1d. Maintenance and depreciation cost £3,933 11s. 11d. and licences £1,115. The road freight services brought in £3,033 5s. 4d. with a profit of £162 14s. 9d.; maintenance and depreciation cost £843 19s. 11d. and licences £258 9s.



Six-wheelers for the War Office

A further batch of rigid six-wheeled Thornycroft chassis of the Tartar class, fitted with War Department general service bodies, to carry a net load of 3 tons across rough country, has just been completed for the War Office. The principal features in the design are an overhead valve six-cylinder petrol engine developing 75 h.p., eight forward speeds and two reverse speeds, giving a wide range of ratios for travelling over virgin country, a patented system of bogie axle suspension permitting 11 in. difference in driving axle levels and allowing either axle to tilt to an angle of 15 deg., and large low pressure tyres 9.00 in.-22 in.). With the driving controls brought forward, a body space of 15 ft. 8 in. is provided.

THE LOCOMOTIVE THAT HOLDS WORLD SPEED RECORDS

A brief description of L.N.E.R. Pacific No. 2750, "Papyrus," with leading dimensions. Also a note on its normal duties and tribute to its crews



THE London & North Eastern Railway 4-6-2 locomotive No. 2750 *Papyrus*, which hauled the record breaking train from London to Newcastle and back on Tuesday, March 5, belongs to the Super-Pacific series, and was built at the Doncaster works of the railway company in 1928 to the designs of Mr. H. N. Gresley, C.B.E., Chief Mechanical Engineer.

The locomotive conforms in all its main characteristics to the others of the same series, and is fitted with a corridor tender to meet the requirements of the non-stop schedule between London (King's Cross) and Edinburgh (Waverley). It carries a boiler pressure of 220 lb. per sq. in. and has three 19 in. by 26 in. cylinders to which steam is distributed by piston valves actuated by Gresley-Walschaerts valve motion. The 8 in. diam. piston valves have a maximum travel of $5\frac{3}{4}$ in. with steam lap $1\frac{1}{8}$ in. for the outside and $1\frac{1}{2}$ in. for the inside cylinder and zero exhaust lap. The cut-off in full gear is 65 per cent.

Other particulars are: heating surface (evaporative) 2,736.6 sq. ft., superheater 706 sq. ft., making a combined total of 3,442.6 sq. ft. The grate area is 41.25 sq. ft. and boiler horsepower 1,750. The engine weighs, with its tender, in working order $158\frac{3}{4}$ tons, of which 66 tons are available for adhesion. It develops a tractive force at 85 per cent. of the boiler pressure of 32,909 lb.

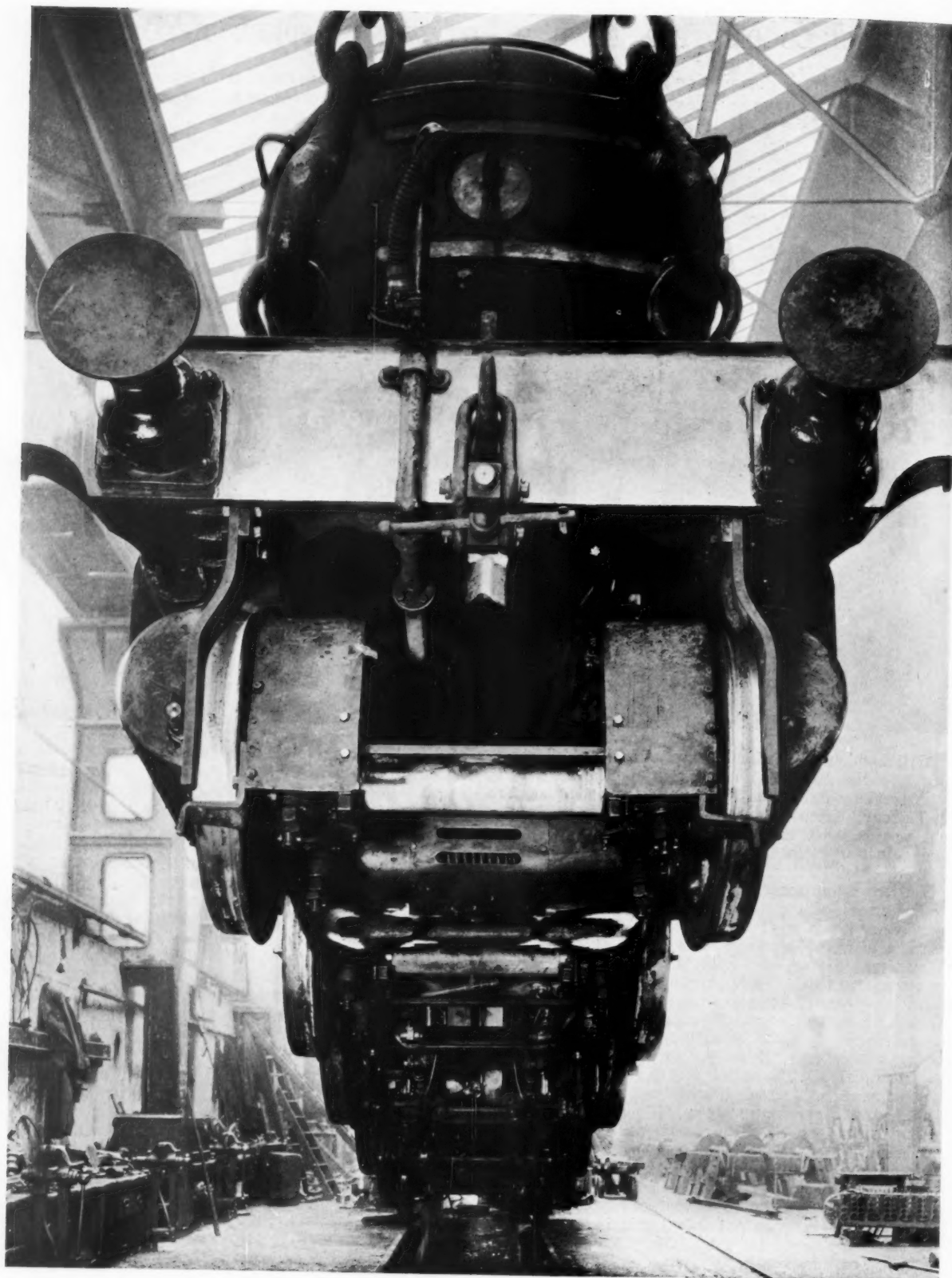
Since the engine was put into traffic in 1928 it had run, up to the time of the test, 392,853 miles. It was last turned out of shops in January of this year and since the 29th of that month had completed 7,719 miles, an average of approximately 1,544 miles a week.

The engine is one of three A.3 type locomotives stationed

at King's Cross and is used regularly with others on the three daily through workings, at 10 a.m., 1.20 p.m. and 5.30 p.m. from King's Cross to Newcastle, as well as the corresponding up services, all of which are very heavy trains on fast timings. During the summer season the engine takes its turn on the non-stop run from London to Edinburgh. It was engaged in its usual workings up to the day of the test run, and on the following day was put back in the ordinary service and worked the 5.30 p.m. train from King's Cross to Newcastle.

Driver H. Gutteridge, who drove *Papyrus* on the trial run from King's Cross to Newcastle, is the regular driver of the engine, and Driver W. Sparshatt, who drove on the return journey, is in the same link; the latter was also the driver in both directions on the high speed test run from London to Leeds and back on November 30 last. Both men, with their firemen (A. Wightman and R. Webster respectively), deserve congratulation on the able way in which the locomotive was handled.

On the Newcastle run, Mr. O. Bulleid, Assistant to the Chief Mechanical Engineer, and Mr. Jarvis, of the dynamometer car staff, travelled for a part of the time on the footplate. The engine was remarkably steady while running at the very high speeds attained, and it could not at any time be said to have reached its utmost limit in the latter direction. The boiler supplied an amplitude of steam throughout the run, and in fact the safety-valves were blowing off at occasional intervals on the run. The piston speed on this occasion was 1,965 ft. a minute and at 108 m.p.h. the revolutions of the driving wheels numbered 453.6 a minute. (See also pages 493 and 501).



Underside of 3-cylinder Pacific type locomotive, L.N.E.R. No. 4477, "Gay Crusader"

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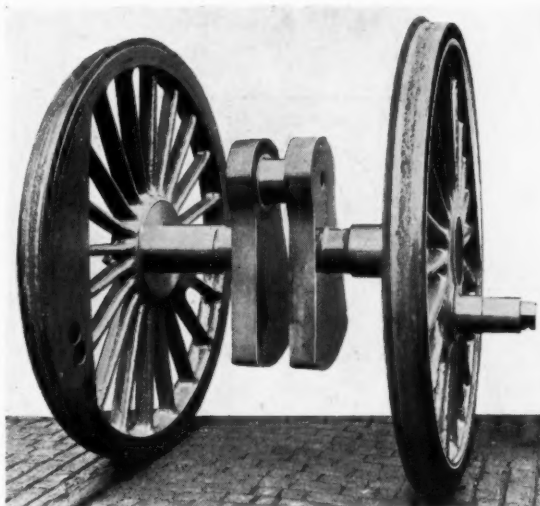
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BUILT-UP CRANK AXLES FOR MODERN EXPRESS LOCOMOTIVES

The selection of the material and the processes involved in the machining and assembly of these highly stressed parts call for the maximum degree of precision

By ROBERT A. THOM, M.I.Mech.E., Mechanical Engineer, Southern Area, L.N.E.R.

THE production of a pair of driving wheels with built-up crank axle for a modern three-cylinder locomotive presents some very interesting features; and in order to ensure immunity from failure and a reasonable life it is essential that the greatest care should be exercised in the selection of suitable materials and the highest degree of precision in the processes of machining and assembling. From experience obtained with a large number of Mr. Gresley's three-cylinder Pacific engines, materials to the specifications shown in the table below have been found most suitable. To these specifications, suitable forgings having a machining allowance of $\frac{3}{8}$ in. are obtained.



Built-up crank axle for 4-6-2 type locomotive

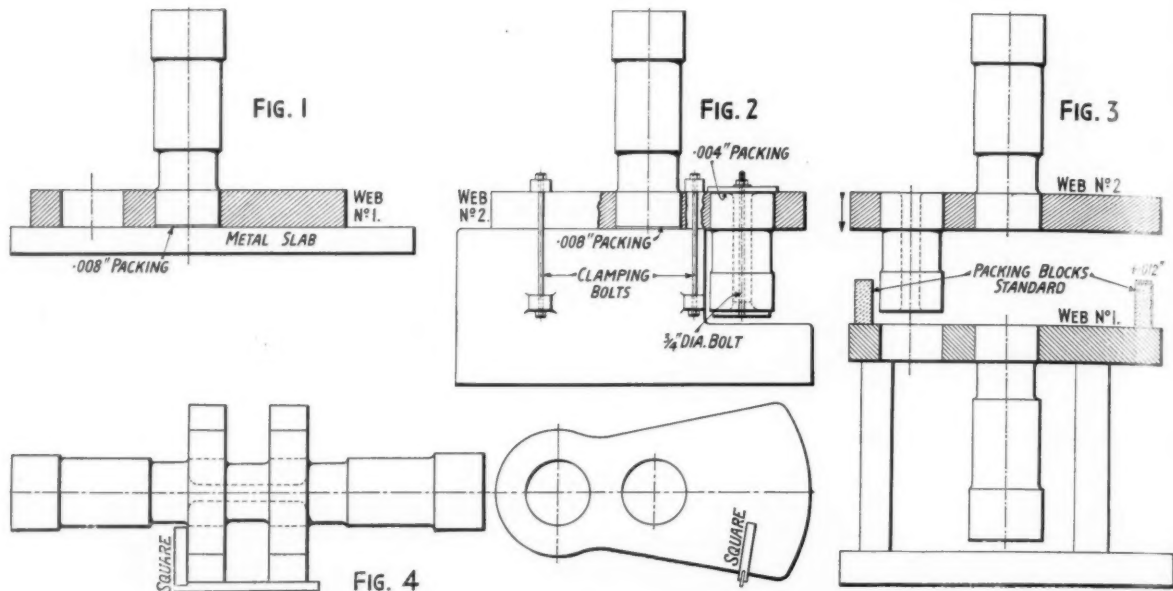
The method of assembly is shown in Fig. 1. Web No. 1 is first brought up to the required heat, i.e., 620° F., by gas and compressed air. The jets in the gas ring are equally disposed round the web perimeter in order to give as uniform a heat as possible throughout the whole mass of the web. Web No. 1 is placed on a metal slab and packing 0.008 in. thick located in the bottom of the hole. The shaft end is then inserted and allowed to cool out naturally. Web No. 2 is heated and lowered on to the crank pin, which has previously been placed in position on a stepped block as shown at Fig. 2; the crank web is then clamped to the block, and the shaft inserted with a 0.008-in. packing in the base of the hole.

Machining and Assembling
The webs are dealt with throughout in pairs and are scheduled in the following sequence—planing, marking out to profile, slotting, boring for shafts and pins, and finally grinding out in the bores to the standard nominal dimension. The shafts and pin are first turned all over, leaving an allowance for finishing on the journals and on the wheel seats after assembly, and for finish grinding the web seats. The latter are finished with an allowance of plus 0.018 in. in diameter for shrinking on of the crank webs.

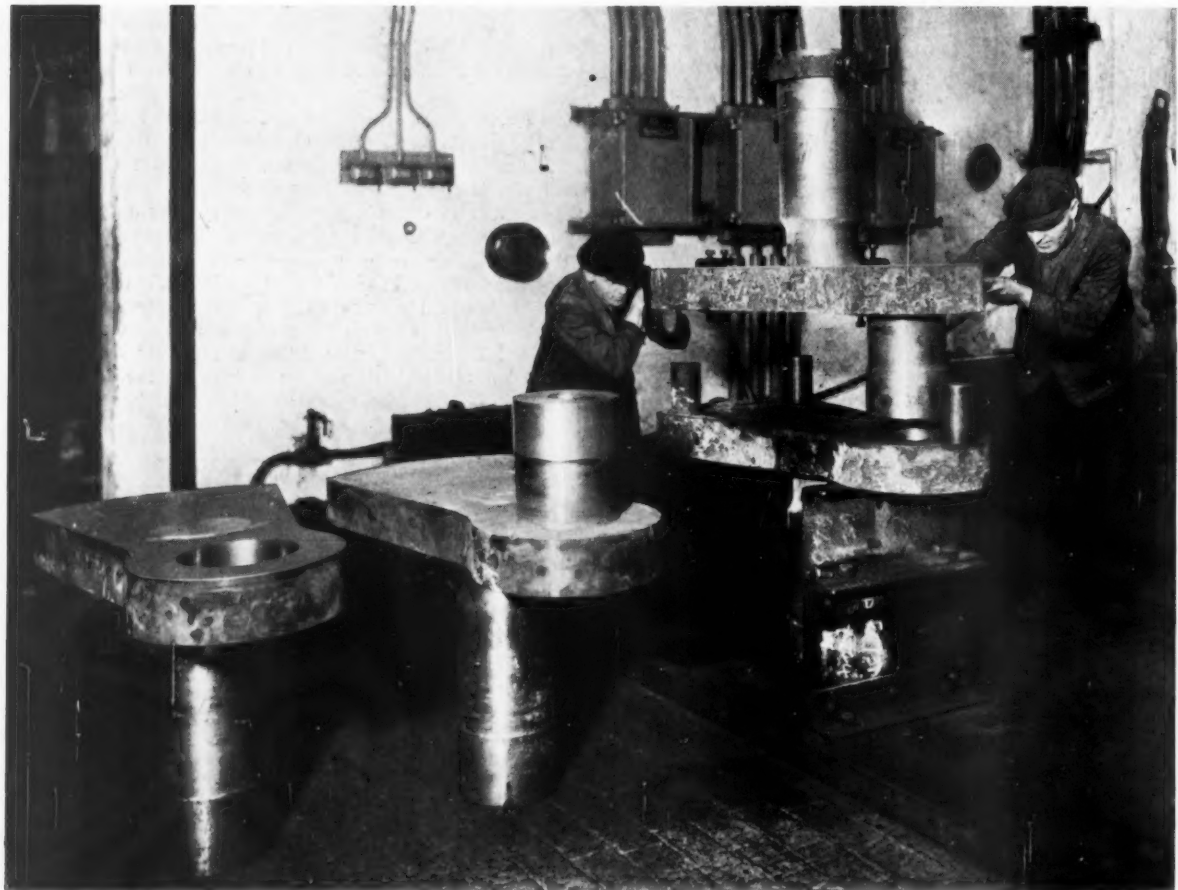
The pin is then pulled home by means of a $\frac{3}{4}$ -in. bolt against a 0.004-in. packing. After cooling out, all dowel pin holes are drilled, tapped and the screwed dowel pins fitted. No. 1 web, with shaft in position, is now located as shown in Fig. 3 and heated. A distance piece of the standard dimension between the webs is placed at the crank pin end of the web and distance pieces of standard dimension, plus 0.012 in., at the extreme end of the balance weights as seen in Fig. 3. No. 2 web with its shaft and crank pin is next lowered on to the distance pieces, the pin entering the hole in No. 1 web and the whole

Description	Max. Stress, Tons per sq. in.	Yield, Minimum	Reduction of Area, per cent.	Elong. on 3 in., per cent.	Cold Bend Test, 1½ in. sq.	Analysis (per cent.)					
						Car.	Sil.	Mang.	Sul.	Phos.	Molyd.
Crank Axle—									Max.	Max.	
Webs—Steel ..	45—50	50 per cent.	35	15/10	90°	0.44	0.215	0.83	0.05	0.05	—
Shafts—Steel ..	32—38	50 „ „	57	26/20	180° ends together	0.22	0.121	0.65	0.05	0.05	—
Pins—Steel ..	42—50	25 tons per sq. in.	45	21	180°	0.25—0.30	0.3 max.	1.4—1.8	0.05	0.05	0.2—0.3 Izod 25 ft. lb.
Crank pins—											
Outside—Steel ..	40—45	50 per cent.	47	20/15	180°	0.37	0.24	0.89	0.05	0.05	—
Wheel Centres—	26.0 } Cast steel ..	54 „ „	55	20	Test 1 inch dia. 120°	0.30	0.259	0.57	0.06	0.06	—
Tyres—Steel ..	50—55	62 „ „	22	On 2 in. 13/11	—	0.57	0.196	0.79	0.04	0.04	—

Specifications for materials used for built-up crank axles



Figs. 1 to 4—Sequence of operations in the assembly of built-up crank axles



Stages in the assembly of built-up crank axles for 4-6-2 type locomotives at Doncaster works

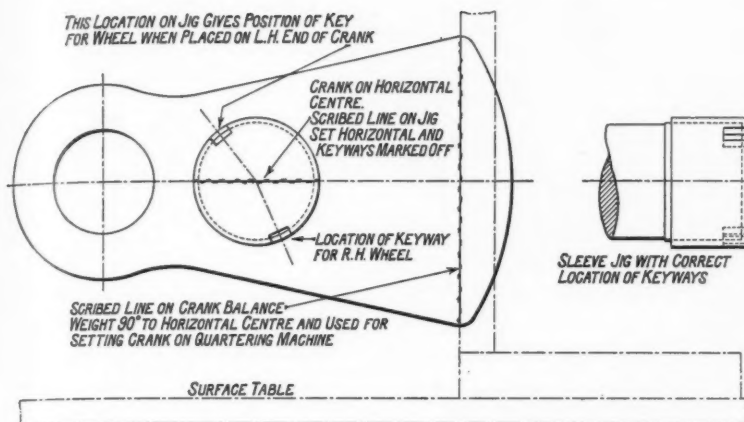


Fig. 5—Marking keyways by means of a jig

assembly allowed to cool out, with the No. 2 web resting on the three distance pieces mentioned in the previous paragraph, the alignment of the crank webs being secured as shown in Fig. 4. The packings and distance pieces of the before-mentioned dimensions have been found to be those which give the best results in bringing the pin ends exactly flush with the webs, and the webs perfectly parallel after cooling down.

After the assembled crank has cooled down, the dowel pin is fitted to the crank pin just inserted. The photographic illustration on page 512 viewed from left to right shows: web No. 1 shrunk on to the shaft end; web No. 2 shrunk on to the shaft end and crank pin; and web No. 2 with shaft end and crank pin shrunk in, being lowered so that the crank pin enters the hole in web No. 1. The distance pieces are also shown in position on the No. 1 web.

The shaft is then turned on the wheel seats and is then marked off for the keyways. This marking off defines the location for the pressing on of the wheels relative to the centre crank and must be done carefully. The shaft is set up with the crank pin on the horizontal centre, and by means of a jig as shown in Fig. 5, applicable to the particular engine crank settings the keyways are marked and cut. While the crank is in this position a vertical line is scribed down the wider part of the balance weight as shown, to assist in the subsequent setting of the wheel in the quartering machine.

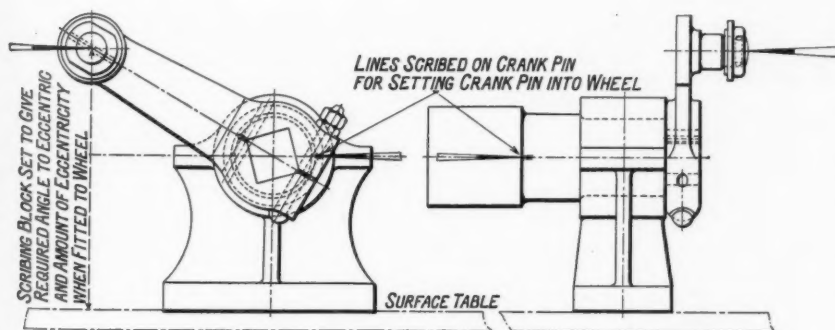
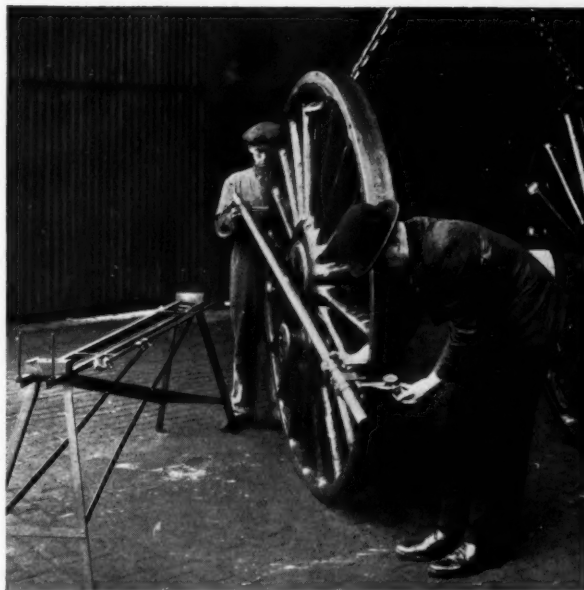


Fig. 6—Scribing lines on pin and arm

Machining Outside Crank Pins

The two outside crank pins are accepted from the forge as one forging with a minimum machining allowance of $\frac{1}{4}$ in. in diameter. They are machined on a No. 15 Ward hollow spindle turret lathe, the use of which enables the two pins to be completely turned, with the exception of the finishing of the wheel boss portions, in two settings. The square end of the pin is now machined and the return crank arm of the Walschaert valve gear fitted on. Following this latter operation the pin and arm are set up as shown in Fig. 6 and two lines diametrically opposed marked on the surface of the pin as indicated.

On fitting the crank pin into the wheel, these two lines will coincide with a line scribed on the wheel centre joining the centre line of the axle to the centre line



Measuring diameter of wheel centre with precision type calliper gauge

of the pin and will give to the return crank its correct angle and throw.

Fitting Wheels and Tyres

After the preliminary machining of the wheel centres, the wheels are marked off and slotted for the keyway, and are pressed on with a minimum tonnage of 10 tons per inch and a maximum of 13 tons per inch of diameter of the wheel seat. The hydraulic press used is of Henry Berry & Co.'s manufacture and is of 400 tons capacity, and the pressures are recorded on a Budenberg Gauge Company's

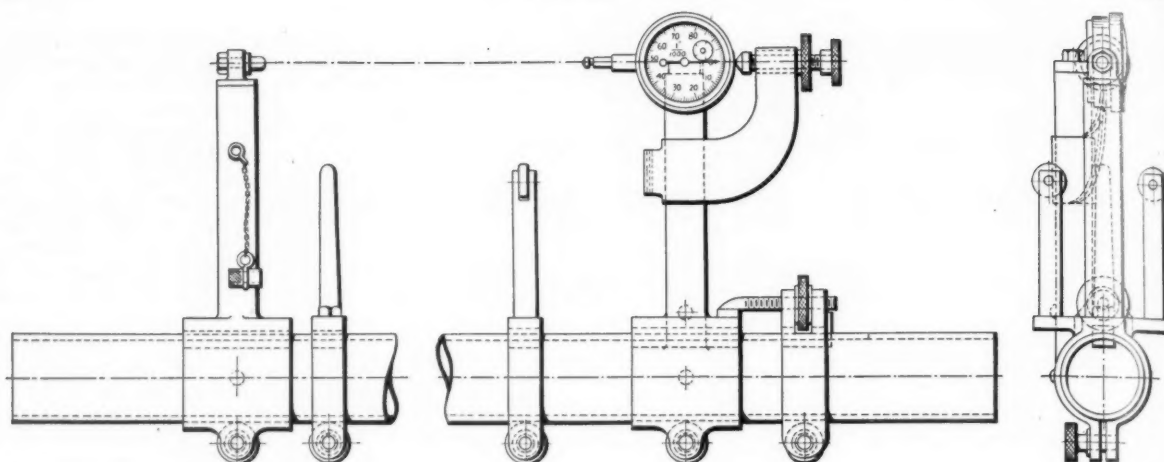
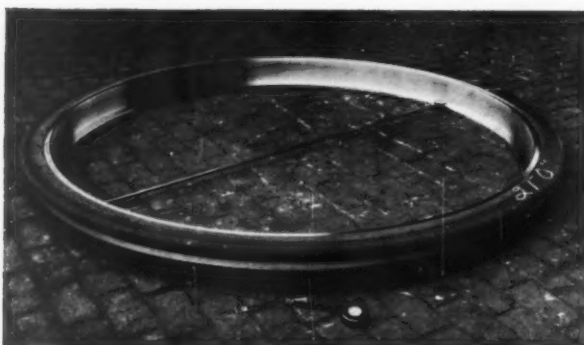


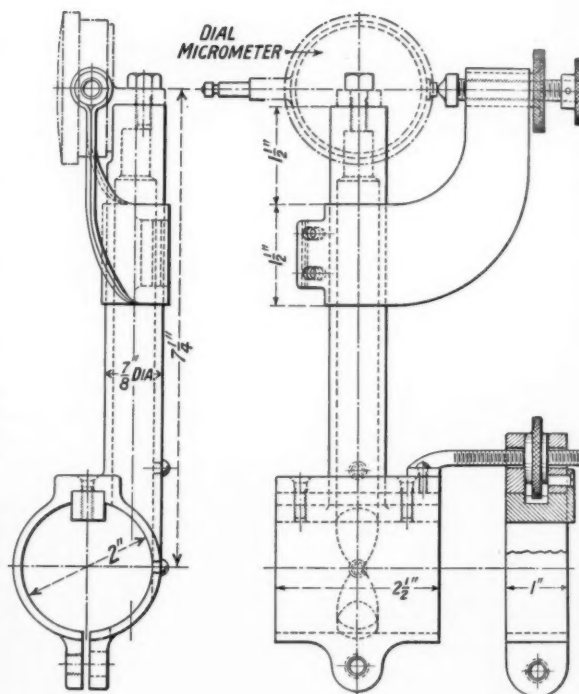
Fig. 7 (above)—Calliper precision gauge used for ensuring correct allowance between outside diameter of wheel centre and inside diameter of tyre; (right) details of gauge and fittings

recording gauge. In order to locate the wheels at the correct angle relative to each other and to the inside crank, they are pressed on with trial keys in position on the axle. The wheel centres are then keyed up and the wheels turned to standard size, on the rim, to receive the tyre.

The method adopted to ensure the correct allowance between the outside diameter of the wheel centre and the inside diameter of the tyre is as follows:—The first gauge is a caliper of the precision type in which the readings are shown on a dial indicator, as seen in Fig. 7. In measuring the wheel centre the position of the dial is adjusted to read a figure equal to the shrinkage to be allowed. On removing the gauge from the wheel the dial reading returns to zero and the actual dimension of the gauge is equal to the required diameter of the tyre bore. To this dimen-



Taking internal measurements of tyre with precision pillar gauge



sion a dial recording pillar gauge is, as shown in Fig. 8, set for use in boring the tyre. These recording gauges eliminate the element of "feel" and a tolerance of plus or minus 0.005 in. can be guaranteed. While the tyre is in the machine for boring, a narrow parallel portion, wide enough to accommodate a steel tape, is turned on the periphery and the circumference at this point is recorded. The illustration alongside shows the pillar gauge inserted

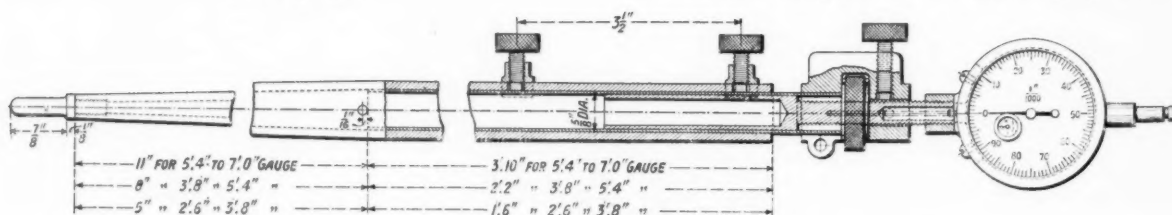
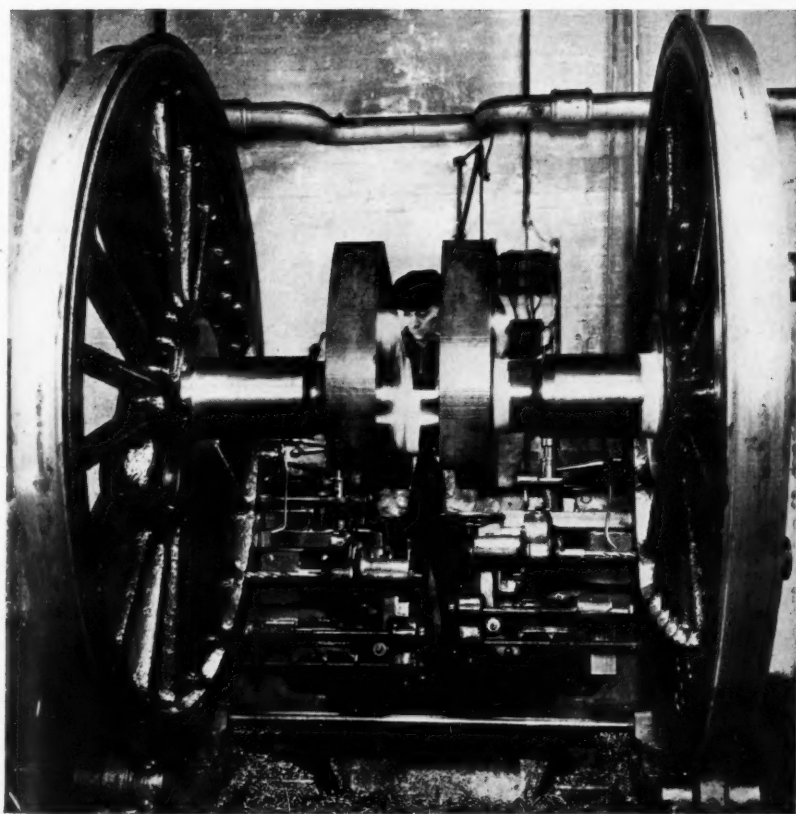
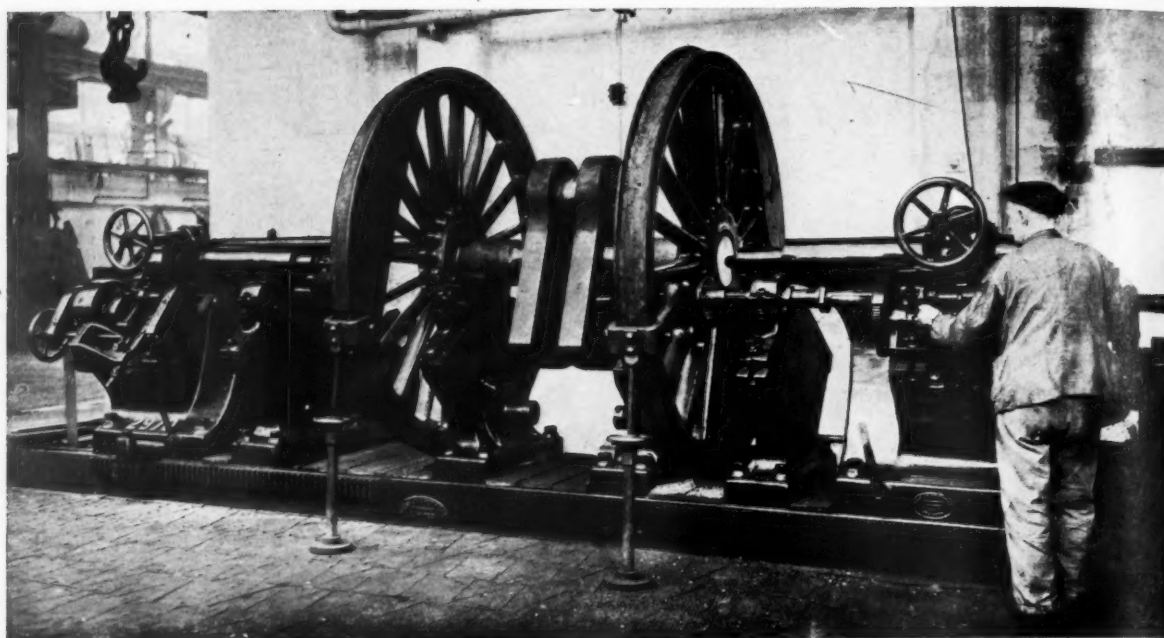


Fig. 8—Details of dial recording pillar gauge used when boring tyre

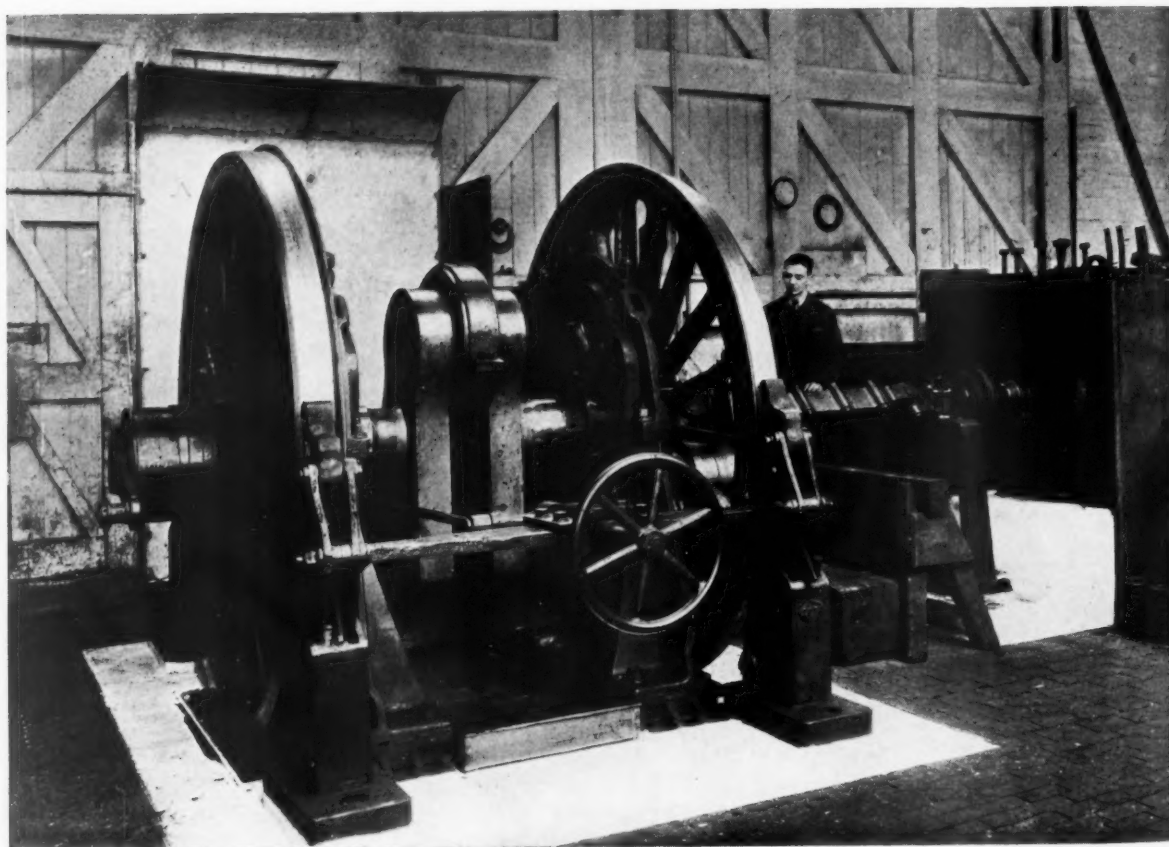
*Right: Measuring circumference
of tyre with steel tape*



*Left: Drilling holes for tyre
rivets on Asquith double headed
machine*



Craven crank-pin quartering machine in wheel shop at Doncaster works

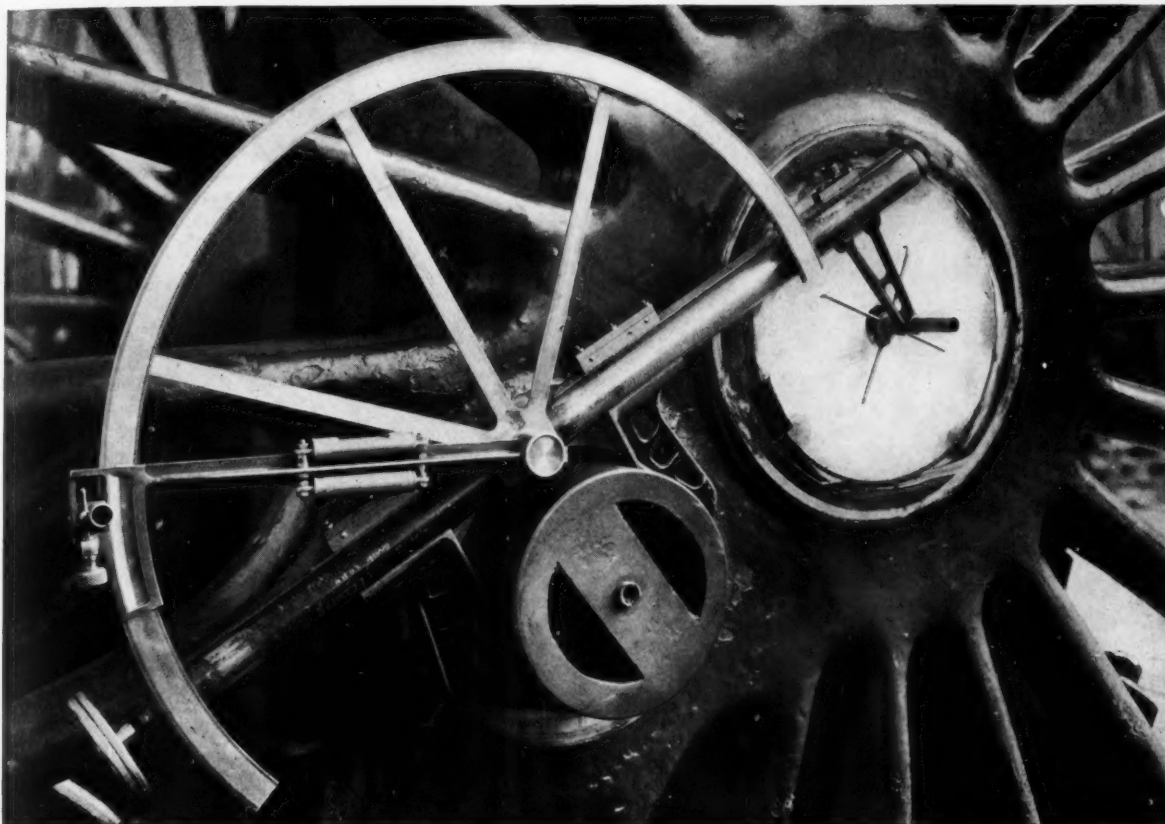


Doncaster-built wheel balancing machine

in a tyre and also the narrow parallel portion turned on the periphery of the tyre.

The tyres are heated by gas jets disposed equally round the outside circumference of the tyre and the wheels lowered into position. After cooling down, the circumference is again measured with the steel tape; the difference between this dimension and the one taken previous to shrinking checks the proportion of the shrinkage taken by the wheel centre and by the tyre respectively.

corded by the protractor is adjusted by resetting the holes with the necessary amount of eccentricity to the headstock centres. The holes are then finished ready for the reception of the crank pins. These are pressed into the wheels with a pressure of not less than 10 tons per inch of diameter and are riveted over into the countersunk recess on the inside. Their angular position within the hole is fixed by means of the points marked on the pin at the fitting of the eccentric crank



Lamazière Bünzli precision protractor used for checking driving wheel angles

The wheels are then drilled through the tyre lip and the wheel rim for the rivets. This is performed on an Asquith double-headed tyre rivet drilling machine. After riveting the tyres are turned to contour and gauge and the wheels pass to the quartering machine.

The Quartering Machine

This is a double-headed Craven machine in which the headstocks are set to bore the right and left hand crank pin holes at 120 deg. to each other. With three cranks set equally round the circle it is only necessary to locate the wheels in the machine with the centre crank vertical to obtain the correct angular spacings. Where the inside crank varies from the 120 deg., the necessary deviation from the vertical is first approximated. Trial holes are bored and dummy crank or locating pins fitted.

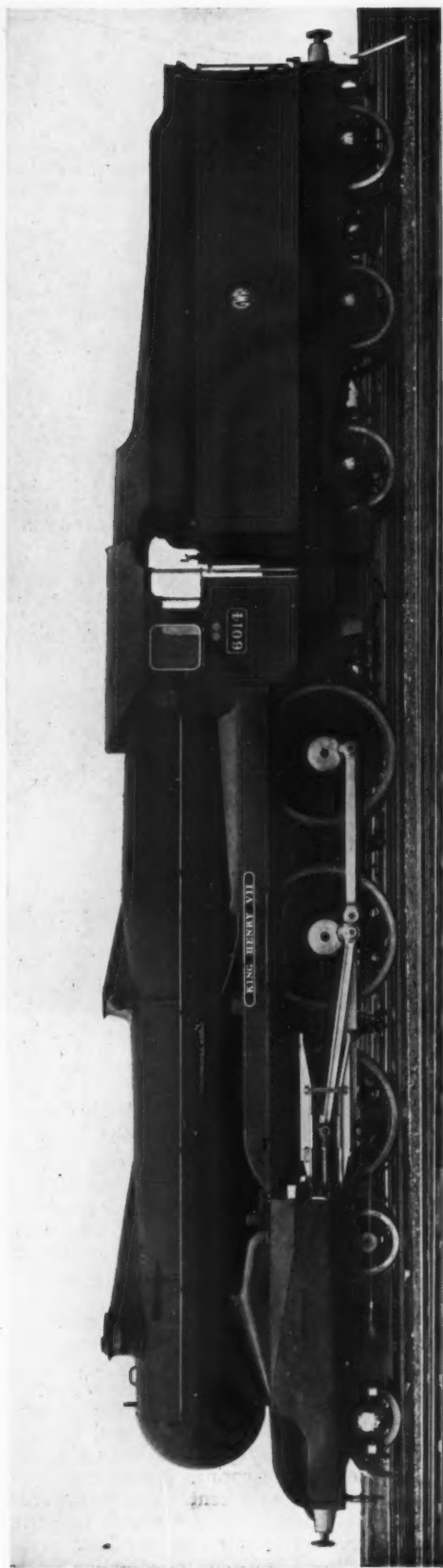
The centre crank is then swung again to the vertical, use being made of the scribed line across the balance weight previously mentioned, and the angles of the pins checked over by a Lamazière Bünzli precision protractor designed specially for checking driving wheel angles. The trial pins are then withdrawn. Any error re-

and the scribed line on the wheel centre casting. The completed wheels are placed between centres, and the journals finished to within a limit of plus or minus 0.002 in.

Balancing

The final operation is that of balancing the completed wheels in the special machine built at Doncaster Works, as illustrated on the previous page. The wheels are supported at the journals in bearings mounted in a series of helical springs, one spring being placed at each of the four 45 deg. positions from the vertical and horizontal centres. A weight equal to the revolving weight of the rods and the proportion of the reciprocating weight to be balanced is secured to each crank pin. From 10 to 15 lb. above the calculated weight necessary for balancing has been left in the balance weight crescent. The wheels are now revolved by means of an electric motor and any out of balance effect recorded by the oscillation of the springs is corrected by drilling out on the inside of the crescent. This procedure is continued until it is possible for the wheels to be revolved at a speed equivalent to one mile per hour per inch of tyre diameter without any signs of vibration.

Experimental Streamlining of G.W.R. Locomotives



The G.W.R. is carrying out experiments in streamlining express locomotives with the object of reducing wind resistance and effecting economy in coal consumption. An engine of the "King" class, No. 6014 "King Henry VII," has already been converted, as shown in the illustrations above. This will be followed by experiments of a similar type with engines of the "Castle" class

RAILWAY NEWS SECTION

PERSONAL

After ten weeks' inspection tour in India, Col. W. R. Izat, Managing Director of the B. & N.W. Railway, left that country for England on January 26.

Mr. Harold Sinclair, Managing Director of the Hydraulic Coupling & Engineering Co. Ltd. has left England for a business trip in the United States and Canada.

L.M.S. APPOINTMENTS

The following appointments have been approved by the directors:—

Chief Commercial & Chief Operating Managers' Department

Mr. S. Rigg, Clerk (Docks & Canals), Chief Commercial Manager's Office, Euston, to be Assistant Superintendent, Wyre Docks, Fleetwood.

Mr. G. W. Ainscough, Goods Agent, Burnley, to be Goods Agent, Alexandra Dock.

Mr. H. Cresswell, Cartage Clerk, District Goods Manager's Office, Manchester, to be Goods Agent, Trafford Park and Manchester Docks.

Chief Commercial Manager's Department

Mr. H. Finch, Stationmaster and Goods Agent, Wigston South (also supervises Wigston Magna and Wigston Glen Parva), to be Parcels Agent, Leeds.

Chief Marine Superintendent's Department

Captain W. L. Sinclair to be Marine Superintendent and Harbour Master, Holyhead.

Mr. W. V. Appleton, who has recently been appointed Vice-President—in addition to retaining his title of General Manager—of the Atlantic Region, Canadian National Railways, was born in 1878 and joined the Intercolonial Railway in 1890. After gaining clerical and mechanical experience, he rose to be Assistant to the Superintendent of Motive Power and General Master Mechanic in 1913. Five years later, when the Intercolonial became part of the Government Railways, he was appointed Superintendent of Motive Power and Mechanical Superintendent. On the formation of the Canadian National system in 1920, Mr. Appleton became General Superintendent of Rolling Stock, and in 1923 was promoted to be General Superintendent of the Atlantic Region. It was in April, 1924, that he became General Manager of the region.

We regret to record the death, on March 7, of Mr. Henry Charles Allen, a Director of many British-owned South American railways, and, until December, 1933, Chairman of the Buenos Ayres Great Southern Railway. Mr. Allen was born in 1856, and after training with Deloitte, Plender, Griffiths & Co., accountants, Mr. Allen occupied a position in the London office of the Central Argentine Railway from 1876 to 1883. He then

B.A.G.S. Board in 1901. He retired from the Secretaryship of the Central Uruguay in 1903 on his election to the board of that and its allied railways. On the reorganisation of the Buenos Ayres Midland Railway in 1908, Mr. Allen was appointed by the B.A.G.S. Board one of its representative Directors. In 1910 he retired from the position of London Manager and Secretary of the B.A.G.S., on being elected a Director of that company, and was appointed Deputy Chairman in 1916, when he also became a Director of the B.A. Western Company. He was, moreover, elected a Director of the Great Western of Brazil in 1911, and of the Midland of Uruguay and of the Uruguay Northern Railway Companies in 1919. It was in 1924 that Mr. Allen was appointed Chairman of the Buenos Ayres Great Southern Company, the position from which he resigned at the end of 1933 by reason of advancing years; he retained his seat on the board.

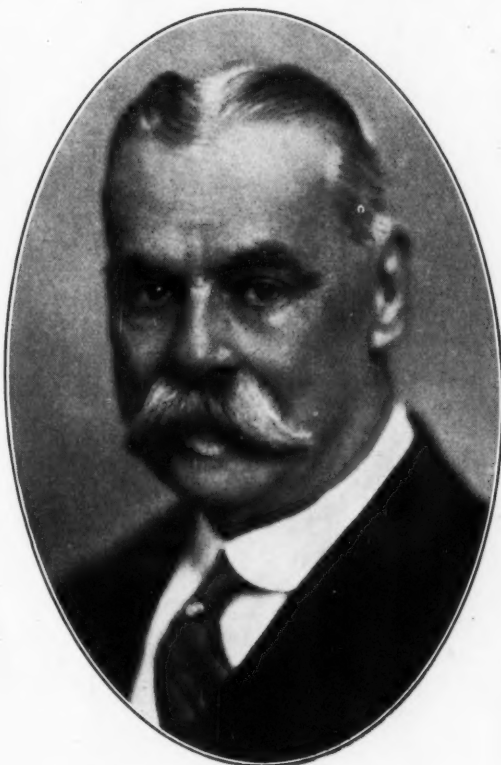
The funeral service was held at 3 p.m. on March 11, at St. John's Church, Woking. Among those present were:—

Sir Follett Holt, Lt.-Col. Woodbine Parish, Sir Eastman Bell, Bt., Messrs. J. M. Eddy, W. W. Parish, C. H. Pearson, G. R. Cable, F. Fighiera, H. O. Tubby, C. H. Lambert, C. E. Rich, R. Graham, A. J. Medlycott, P. Middlemas (representing Mr. Bernard Docker), E. L. Clarke, N. Stuart, and the staffs of the B.A.G.S., B.A. Western, Central Uruguay, Buenos Ayres Midland, and Great Western of Brazil Railways.

We regret to announce the death, on March 2, of Mr. C. W. Bryant, C.B.E., Managing Director of Peter Brotherhood Limited.

Mr. W. S. Graff Baker, as announced in our issue of February 22, has become Chief Mechanical Engineer (Railways),

London Passenger Transport Board, in succession to Mr. W. A. Agnew. He was educated at Colet Court and St. Paul's Schools, Cleobury Mortimer College and Johns Hopkins University, and at the City and Guilds (London) Central Technical College, where he obtained his B.Sc. degree and A.C.G.I. diploma. He joined the "Underground" in September, 1910, and, after spending some time in the workshops and drawing office of the Chief Mechanical Engineer's Department and in the Traffic and Civil Engineer's Departments, he was appointed Junior Technical Assistant in the Chief Mechanical Engineer's Department in October, 1912. In April, 1913, he was made



The late Mr. Henry Charles Allen,

Sometime Chairman B.A.G.S. and a Director of this and other British-owned South American railways

became Registrar and Accountant of the B.A. Great Southern, and in 1890 was appointed Secretary of the Central Uruguay Railway of Monte Video, retaining, however, his connection with the B.A.G.S. as Advisory Accountant and Registrar. In 1892 he became Secretary of the latter railway, and in 1893 took over the duties hitherto performed jointly by the Managing Director of both the B.A.G.S. and Central Uruguay systems, being thus constituted the chief executive officer in London for the two companies. In recognition of the increase in the scope and extent of the duties entrusted to Mr. Allen, he was appointed London Manager as well as Secretary by the

an Assistant in connection with the maintenance of lifts and escalators, and later for new escalator installations, and in March, 1921, Electrical and Personal Assistant with responsibility also, under the Chief Mechanical Engineer, for equipment of new rolling-stock. In December, 1921, Mr. Graff Baker was given the title of Car Superintendent and a year later was appointed Assistant Mechanical Engineer, which post he carried on under

Oxford, the Sorbonne, Paris, and Queen's College, Oxford, where he took an Honours Degree in Jurisprudence. He was called to the Bar in 1912, served in France in 1914-15 until invalided home, and in 1917 was seconded for service with the Ministry of National Service, where he was an Assistant Secretary. From 1919 to 1926, Mr. Rawdon Smith was with a well-known rubber manufacturing company, with whom he had extensive

1929; and was reappointed Assistant Secretary in March, 1930. In July, 1933, upon the formation of the London Passenger Transport Board, he was appointed to the position of Assistant Secretary to the board, which he has held up to the present time.

Mr. H. S. Chapman, who, as announced last week, has been appointed Assistant Secretary to the London



Mr. W. S. Graff Baker, B.Sc.,
Appointed Chief Mechanical Engineer (Railways),
L.P.T.B.



Mr. Edward Rawdon Smith,
Appointed Public Relations Officer,
L.P.T.B.



Mr. H. S. Chapman,
Appointed Assistant Secretary,
L.P.T.B.



Mr. W. F. Pettigrew,
Elected President of the Retired Railway Officers'
Society for 1935



The late Mr. F. C. Coleman,
Founder and Managing Director of
Modern Transport



Mr. M. G. Stahl,
Appointed Grain Superintendent,
South African Railways and Harbours

the London Passenger Transport Board, until his recent promotion to Chief Mechanical Engineer (Railways), to the board.

Mr. Edward Rawdon Smith, whose appointment as Public Relations Officer, L.P.T.B., we recorded last week, was educated at St. Edward's School,

experience in France and South Africa as well as England. He joined the Underground group of companies as Assistant to Sir Ernest Clark in March, 1926, in which capacity he spent some time in Australasia. Mr. Rawdon Smith was afterwards appointed Assistant Secretary to the Underground group; became Staff Officer in August,

Passenger Transport Board, was born at Catford in May, 1890, and educated locally. He entered the service of the Metropolitan Railway in 1904, being appointed to the Registration Department, and was made Transfer Clerk in October, 1922. Four years later he was appointed Chief Clerk to the Secretary, and on January 1, 1929,

became Secretary. Following the formation of the London Passenger Transport Board, Mr. Chapman was engaged in the winding-up of the Metropolitan Railway Company, and on May 1, 1934, became Public Information Officer of the board.

Mr. W. F. Pettigrew, M.Inst.C.E., M.I.Mech.E., who, as announced in THE RAILWAY GAZETTE of February 15, has been elected President of the Retired Railway Officers Society for 1935, entered the service of the Great Eastern Railway at Stratford as a pupil under the late Mr. William Adams, Locomotive Carriage & Wagon Superintendent, subsequently serving under the late Mr. Massey Bromley, Mr. T. W. Worsdell and Mr. James Holden. In 1882 he was appointed Assistant Manager of the Stratford Works, and four years later proceeded to the former London & South Western Railway as Works Manager at Nine Elms under his original chief, Mr. Adams, who had become Locomotive Superintendent of that railway. In 1897 he became the Chief Mechanical Engineer (Locomotive, Marine and Docks) of the Furness Railway, from which position he retired on March 31, 1918. During the war period he was a member of the Committee of Railways in the North West of England for assisting in munition production, and, in addition, was Chairman of the Area Board Transport Committee for that district. Mr. Pettigrew is the author of several papers read before the Institution of Civil Engineers, the Institution of Mechanical Engineers, and the Iron and Steel Institute, and he obtained the George Stephenson Medal and Telford Premium for one on the "Trials of an Express Locomotive." He was also reporter on "Automatic Couplers" at the International Railway Congress held at Washington, U.S.A. in 1905, and is author of "A Manual of Locomotive Engineering." Mr. Pettigrew is a past President of the Association of Railway Locomotive Engineers of Great Britain and Ireland, and was the first President of the Barrow Association of Engineers.

Mr. M. G. Stahl has been appointed Grain Superintendent of the South African Railways and Harbours. He was born at Middelburg, Cape, and was educated in South Africa and America taking the first two years of the B.Sc. (Agriculture) course at the University of Cape Town, and completing the course at the University College, Pretoria. Awarded a Government scholarship, he went to the U.S.A., where he first took a course at Cornell University, later proceeding to the State College of Agriculture at Manhattan where he gained the degree of M.Sc. Thereafter he attended the University of Illinois where he secured the degree of M.A. On his return to the Union, Mr. Stahl joined the Department of Agriculture in 1922 as

lecturer in Field Husbandry at Elsenburg College of Agriculture, and in 1926 went to Pretoria to take up the post of Senior Research Officer in Field Crops.

Messrs. Merz and McLellan, Consulting Engineers, announce the introduction of Mr. Francis Lydall into partnership.

It is with great regret that we record the death, on March 11, of Mr. Frederick Charles Coleman, Founder and Managing Director of our contemporary *Modern Transport*. Mr. Coleman was a delegate at the fifth Imperial Press Conference which is now on an extended tour in South Africa, but sometime before the date of sailing he had been in indifferent health, following an attack of pneumonia, and it was only a few days before January 18, when the British members of the delegation sailed, that his doctors decided to recommend him to make the journey in the hope that it would aid convalescence. An unfortunate relapse in the course of the voyage resulted in his being conveyed to a nursing home in Cape Town immediately on his arrival on February 4, and it was there that he died on Monday, at the age of 56. Mr. Coleman, who was born in Norfolk on June 14, 1878, received his education at the Queen Elizabeth Grammar School, Dartington. He entered the service of the old North Eastern Railway in 1894, and served in the Traffic Department of that company until 1906, when he became a transport journalist. For some years he was a regular contributor to THE RAILWAY GAZETTE, and subsequently also represented our associated paper, *Shipbuilding and Shipping Record*, on the North-East Coast. He joined the Artists' Rifles during the war, and on receiving a commission was transferred to the Railway Troops and served as Assistant Adjutant at Longmoor Depot, Hants. Afterwards he was appointed to the War Office as a liaison officer with the Railway Executive Committee in connection with recruitments for military service of British railway personnel. Following demobilisation in December, 1918, with the rank of Major, he was mainly responsible for the establishment of *Modern Transport* in March, 1919, as a weekly paper devoted chiefly to operating aspects of all branches of transport, namely, railway, road, shipping, and aviation.

INSTITUTE OF TRANSPORT

The following corporate member has been elected, and non-corporate graduates and students have been admitted during February:—

Member
Mr. M. J. Canny, Commissioner, Victorian Government Railways.

Graduates
Messrs. B. H. Cresswell, L.N.E.R.; W. H. Jackson and F. Keates, L.M.S.R.; F. H. Nott and C. A. M. Peaty, G.W.R.

Students
Messrs. A. R. Adam, R. W. Clough, S. Humphreys, T. R. Pedley, P. Riley and N. Whaley, L.M.S.R.; and D. McC. Murchie, South African Railways and Harbours.

We are glad to learn that Mr. R. E. L. Maunsell, Chief Mechanical Engineer, Southern Railway, has now recovered from his long and serious illness, and resumed duty at Waterloo on Monday last.

Lt.-Col. R. Tristram Harper, O.B.E., Secretary of the Buenos Ayres Great Southern Railway Company, has been elected a Director of that company and also of the Buenos Ayres Western Railway Company. Mr. Robert Graham, Secretary of the Buenos Ayres Western Railway, has been appointed also Secretary of the Buenos Ayres Great Southern Railway. Mr. C. R. S. Harris has been appointed a member of the local boards of both companies and will leave for Argentina shortly.

INDIAN RAILWAY STAFF CHANGES

His Excellency the Governor General has been pleased to nominate Mr. P. R. Rau, M.L.A., to be a member of the Standing Finance Committee for Railways, of which he will be Chairman.

Mr. L. N. Flatt has been appointed to officiate as Chief Mechanical Engineer, E.B.R., as from January 26, Mr. C. A. K. Bradley who was officiating in that post, reverting to his substantive post of Deputy Chief Mechanical Engineer.

Mr. P. M. Rau has been appointed to officiate as Chief Accounts Officer, E.I.R., as from February 4.

Mr. H. A. Joscelyne, Deputy Chief Engineer, E.B.R., has been granted eight months' leave as from February 14.

Mr. G. St. G. Higginson has been appointed Superintendent General, Commercial Department, B.N.R., vice Mr. A. M. Clark, granted leave, as from February 14.

Mr. J. Humphries has been appointed to act as Superintendent Transportation (Power), B.N.R., as from February 14, vice Mr. P. R. Leigh Bennett, granted leave.

Mr. B. L. Cameron, Deputy Agent Personnel, N.W.R., has been granted eight months' leave as from February 13.

Mr. D. M. S. Robertson, Chief Commercial Manager, E.I.R., has been granted eight months' leave as from February 9.

Forthcoming Meetings

Mar. 26 (Tues.).—Ottoman Railway from Smyrna to Aidin (Half-yearly Ordinary General), Winchester House, Old Broad Street, E.C. 2, at 11 a.m.

Mar. 26 (Tues.).—Temiscouata Railway (Annual General), Chateau Frontenac, Quebec, at 12 noon.

Mar. 27 (Wed.).—Grand Union Canal Company (Ordinary General), 5, Lloyd's Avenue, Fenchurch Street, E.C., at 12 noon.

Mar. 29 (Fri.).—Zafra & Huelva Railway (Ordinary General), Calle de Ayala 54 Bajo Derecha, Madrid, at 5 p.m.

LONDON & NORTH EASTERN RAILWAY COMPANY

*More passengers carried—Results of C.O.D. goods service—
Popularity of train cruises and camping coaches—Experience
with diesel units—Possibility of lower rating assessment*

The twelfth ordinary general meeting of the London & North Eastern Railway Company was held in the Wharncliffe Rooms, Hotel Great Central, Marylebone, London, N.W.1, on Friday, March 8, Mr. William Whitelaw (Chairman of the company) presiding.

The Secretary (Mr. James McLaren) read the notice convening the meeting.

The Chairman: It is with no ordinary regret that we have to record the death since our last annual meeting of Lord Faringdon, and I cannot easily express what his loss has meant to our company. As Deputy-Chairman and Chairman of our Finance Committee ever since the formation of the company his guidance and advice were invaluable. Age seemed to make no impression on him, and up to within two months of his passing away his matchless experience, the outcome of having to grapple with many of the most difficult railway problems over a period of forty years, was day by day at our disposal.

Mr. Hubert Bailey, feeling that his health prevented him from giving what he considered sufficient time to the interests of the stockholders, intimated his desire to retire about the middle of last year. He had served as a Director of the Great Eastern Company for eight years previous to the amalgamation of the companies. He had special qualifications for dealing with important parts of the company's interests, and in addition, being resident in London, he took a very full share in the transaction of the day-to-day business with which the directors have to deal.

To fill these vacancies thus caused the Directors have appointed the Rt. Hon. Lord Burghley, M.P., and Sir Gerald Talbot, K.C.V.O., C.M.G., who will give representation on the board to the important railway district of Peterborough and to East Anglia; they will also be able to devote time to the daily routine work of the board.

The review* of the year's business having been circulated to all stockholders whose names appear on the register, I shall once more not occupy your attention for long.

The net capital expenditure for the year amounted to £1,256,950, of which £167,090 were spent on works under the Development Act, 1929, and £109,378 on Passenger Duty works. In respect of the former we received during the year £96,088 in payment of annual grants. Our estimate of capital expenditure during the current year is £820,000, of which £10,000 will be on Development Act works and £155,000 on Passenger Duty works.

The third class return fare of 1d. per mile must be considered to have been a successful experiment, and it has now become a regular fare with a corresponding first-class fare of 1½d. a mile. The adoption of the first of these fares stopped the continuous decrease in passengers which was previously taking place. During last year we carried over six million more passengers (excluding season ticket holders) than in 1933 and over ten million more than in 1932; the 1934 passenger receipts were £360,000 above those of 1933 and £345,000 above those of 1932.

Passenger Receipts

A comparison of the increases of passenger receipts and passenger train mileage for the periods of twelve months immediately preceding and following the date of the introduction of this fare indicates that they balanced each other. The last winter before the 1d. a mile fare was in force was the period of the four months of November and December, 1932, and January and February, 1933, and the first winter in which it was in force was the corresponding period of 1933 and 1934. In the latter our passenger receipts were £81,000 higher than in the former, and the extra train mileage required to carry the increased traffic in the latter

period is estimated to have cost nearly £50,000. It thus appears that an increase in the net profit during the winter four months makes up for some loss incurred in the other months. In order, however, to arrive at a just conclusion as to the wisdom of having adopted the low fare we must remember that we do not know how much more passenger traffic we should have lost if the old fares had been adhered to: that it would have been large hardly admits of doubt.

Sugar Beet Traffic

The sugar beet traffic during the season was satisfactory, the tonnage dealt with being 1,221,250 tons, an increase of 14 per cent. on that of the previous season; we obtained an average wagon load of 9 tons—the highest figure on record. In addition we carted 119,000 tons from the farms in order to meet the competition of the road hauliers. The total traffic handled in connection with their industry in our southern area amounted during the season to 1,973,000 tons, an increase of 22 per cent. over the corresponding period. The future of this industry is somewhat uncertain; the subsidy for next season will be limited to 375,000 acres for the whole country, whereas the acreage for the season under review was 410,000 acres. Should the subsidy ultimately be withdrawn the result might be serious to the agricultural community of East Anglia and to our own traffic.

Our steamships account shows an adverse balance of £97,537. The improvement in our general railway traffic to a large extent explains this balance on the wrong side of Account No. 12; tariffs and quotas on foreign produce and manufacturers continue to be of much assistance to our home trade, but obviously they have been the reverse to the foreign trade which we formerly carried. A good example of this change is that in 1931 we conveyed from overseas 3,300 tons of cut flowers, and last year this traffic fell to 900 tons.

Continental Services

The year 1931 was the last year during which our overseas trade was carried on under what were then considered normal conditions. Compared with that year our Continental goods traffic for 1934 decreased by 236,219 tons or 49 per cent. Our passenger traffic has not been so seriously affected, and decreased by 41,600 passengers as compared with 1931, though it is about 13,550 more than the number carried in 1933. No doubt this is to a very considerable extent due to the competition of air services, which, of course, deprive us chiefly of those passengers who used to travel at first class fares.

Our services between Harwich and the Hook of Holland continue to do well; last year we carried over 115,000 passengers, being an increase of nearly 12,900 or 12.6 per cent. over 1933. One of the Hook vessels, the ss. *Vienna*, was again employed during the summer for week-end cruises from Harwich, which proved a greater success than ever. The estimated profit to the company was £4,587. There were eleven cruises, and the average number of passengers per cruise was 231, as compared with 207 in 1933. There is some satisfaction to be found in the fact that the estimated rail receipts in respect of the whole of our Continental traffic amounted to nearly £306,000.

Gross receipts from parcels, mails, &c., conveyed by passenger train amounted to £4,357,914, an increase of £30,207 on the 1933 receipts. The figure is the highest recorded since 1931. It is, however, still nearly half-a-million pounds below 1929.

It may interest the stockholders to know that in addition to the general pooling arrangements with the London

* Set out in full on page 526

Midland & Scottish and Great Western Companies, this company is also party to a general pool of receipts of the four amalgamated railway companies from parcels traffic carried by passenger train. The consent of the Ministry of Transport was given to this scheme on August 15, 1934, and it took effect as from January 1, 1934.

The facility which we know as registered transits but which is more popularly known as the Green Arrow Service was introduced by this company in June, 1933, following its successful application by the Great Western company. The facility provides that, in return for a payment of 2s. 6d. for each consignment, the consignor is notified when the consignment is likely to be delivered, and its transit is carefully watched at every stage. During the first month of the operation of the scheme 244 consignments were conveyed by this company, and the figure has shown a consistent improvement until now more than 10,000 consignments are passing every month.

On July 1, 1934, the railway companies introduced a cash on delivery scheme for all consignments of ordinary traffic up to £40 in value. This was done with the consent of the Post Office, whose own scheme is limited to parcels up to 11 lb. in weight and £40 in value. The scheme applies to both goods and passenger train services. Traffic under this arrangement bears a special "C.O.D." address label and its value is declared by senders on a contract form. Commission is charged on a scale varying from 6d. on a value of 10s. to 2s. on a value over £25. During the first six months of the operation of this scheme (July-December, 1934) the number of C.O.D. consignments originating on this company's system was 15,363, for which the commission fees amounted to £699 and the carriage charges were £1,498. The scheme appears to be growing in popularity, as during the first three months of its existence this company handled only 5,529 consignments. We are at present considering whether the limitation of the scheme to consignments not exceeding £40 in value unduly restricts its scope, and the question of increasing the limit of value above £40 is being examined.

Operating Efficiency

The statistics of operating efficiency for 1934 show, on the whole, a favourable comparison with 1933. The average freight train load at 131.74 tons was up by 2.3 per cent., while the average starting point wagon load was better for general merchandise, minerals and coal class traffic, the total of 7.91 tons showing an improvement of 2.33 per cent. over the 1933 figure. As was to be expected in view of the increase in traffic, freight train miles per train hour showed a slight decrease, but the figure of 9.22 miles per train hour for 1934 was only 0.86 per cent. below the figure for 1933. Passenger train miles per train hour, on the other hand, at 14.23 miles per train hour showed an increase of 0.71 per cent. over 1933. This is the highest figure yet recorded, a progressive increase having taken place since amalgamation.

We shall continue during the month of June the popular land cruises, by which in the course of a week our clients are able to visit Yorkshire, the Borders, the whole of the East Coast of Scotland via the Forth and Tay Bridges, the West Highlands, and the English Lakes. The demand for camping coaches continues to exceed the rate at which we can supply them, and although we are extending and developing this form of holiday, it seems almost impossible to provide for all those who apply for accommodation. We had hundreds of applications last year for camping coaches for 1935, and even with the extended arrangements I fear a good many applicants will be disappointed.

I have been asked by the Stockholders' Union to say something about our experience with diesel electric units, and our cross-country passenger services. We have four diesel electric units in service, each capable of seating about sixty passengers. We bought the first as long ago as November, 1932, and it has been working in regular services ever since, particularly on the very heavy section of our line between Scarborough, Whitby and Middlesbrough. The other three units were purchased last year and have also been running in regular services. We have employed them largely

for short trips between points such as Hull and Selby, York and Leeds, &c. On these services they are booked at average over-all speeds from 45 to 48 miles per hour, and to maintain these booked speeds frequently have to run up to 60 miles per hour. They have given us good service, but we still have to obtain more experience of their maintenance costs over long periods.

We have also made extensive trials with a diesel shunting locomotive and a diesel goods locomotive. Up to date, however, the advantages to be derived from diesel units of this type have not appeared to us to be such as to warrant the heavy first cost involved. We are using a diesel electric unit for the purpose of improving cross-country services. I may refer, as an illustration of this, to the improvement which has already been made in the Hull and Birmingham service by the provision of a fast connecting service by diesel electric unit as between Hull and Pontefract.

Cross-Country Services

The whole question of our cross-country services is receiving very close attention at the present time. We have a committee of the company's officers engaged on a special examination of the Hull-Manchester-Liverpool services, and they have already effected very marked improvement in the Newcastle-Manchester-Liverpool service. Additional fast trains are to be put on in the early summer, and I look confidently for further improvements. It has to be borne in mind, however, that these improvements can often be obtained only by cutting out intermediate stops, and that the public requirements have to be very carefully considered. In a densely populated country like ours, the demands of the population along the route of a cross-country service cannot be ignored, and high throughout speeds are therefore difficult of attainment.

You will expect me to make some reference to the position of the company with regard to the assessment of their property to local rates. Under the new Act, the Railways (Valuation for Rating) Act, 1930, the company's railway undertakings in England and Wales falls to be re-valued as a whole, and that value then has to be apportioned among the various rating areas concerned. This valuation, when made, is to date back to April 1, 1931, and remains in force until March, 1936, when a fresh valuation will fall to be made. It is the view of the railway companies that the valuations of their undertakings in the past have been excessive and that a correct valuation under the provisions of the new Act of 1930 should result in a substantial reduction in those assessments.

Valuation for Rating

You will, doubtless, have read in the press of the proceedings in regard to the Southern Railway Company's valuation, and the decision of the Railway and Canal Commission in that case certainly gives us good grounds for thinking that we shall be successful in obtaining a substantial reduction in the company's assessment which today is, in our view, an excessive one. You will, however, not expect me to be more precise on this matter, seeing that it is still *sub judice*.

The ratio of railway working expenditure has been 82.23, as compared with 82.49 in the previous year; joint lines have yielded £15,000 more, interest and dividends in other undertakings are £49,000 higher, and Treasury grants under the Development Act have been £16,000 above those of last year, as a result of the progress made with the various works.

We have again taken £50,000 from our General Reserve in order to meet the sinking fund charge on the 4½ per cent. debenture stock, which is in the nature of a capital repayment and not chargeable to current revenue until the full dividends on the preference stocks are earned. As stated in our dividend announcement, we have reserved £538,000 to meet the expenditure on rolling stock authorised by the board for 1934, but not completed within the year. You may wonder why that figure does not appear separately anywhere in the accounts as submitted. Under the regulations for making up the accounts as approved by the Ministry of Transport and from which we cannot depart, a reserve of this nature is lost sight of by being split up among

the three sections of Abstract B, and is retained in the balance-sheet on the liabilities side under miscellaneous accounts.

For that reason we thought it proper to make the statement in the dividend announcement so that stockholders might know at once how the available income of the year had been disposed of. After reserving this amount the net revenue of the year increased by £625,000 in round figures, enabling the dividend on the first preference stock to be raised to 3½ per cent. and that on the redeemable preference stock to 4½ per cent.

I now move that the report of the directors with relative statement of accounts for the year ended December 31, 1934, be received and adopted.

Sir John M. Wilson: I beg to second that.

The Discussion

Mr. L. F. Clancy, in opening the discussion, raised a number of points which were ruled out of order by the Chairman.

Mr. Miller asked whether the sum of £530,000 taken from revenue for rolling stock could not be distributed over a period of years, so that the senior stockholders would be bearing a share of the cost of the upkeep of the rolling stock. Referring to the loss of £9,000 on canals, he said that if the Government would not allow the derelict canals to be closed because they were required for strategic or other purposes, they ought to be approached on the question of a subsidy. The canals should not be allowed to remain a drain on the company's resources.

Councillor Wilson said he was pleased that the cash on delivery scheme had been inaugurated in July last year, but at the same time was rather disappointed as the first two cases from his factory were refused because £42 10s. was too much money for the company to collect. He therefore suggested the raising of the limit from £40 upwards. He thought that the railways were the greatest of all the national assets, and without them the country would be lost. He asked the Chairman to consider two further points. One was that the railway was losing 25 per cent. of its parcel traffic through not being able to trans-ship this traffic "carriage forward." This class of business was going to the little carrier. Secondly, he was highly delighted at the success of penny-a-mile fares, but still thought they were losing another 25 per cent. of passenger traffic, as a return ticket was necessary to profit by it, and he thought that a penny-a-mile flat rate would again increase that side of the revenue.

Mr. Clancy again asked leave to put a motion to the meeting, but was ruled out of order.

Mr. Welock asked whether the shareholders were to anticipate in the forthcoming year the same high expenditure upon renewals of rolling stock, &c., as was incurred in 1934.

Chairman: Yes; I think it will be probably much the same.

Mr. Scobell Armstrong regretted the absence of reference in the Directors' report and Chairman's speech to the recent Wormley level crossing accident. He wondered whether these gentlemen were aware of the extent to which the danger of the occupation crossings on the line was rendering the line suspect to the public, and was bound in the long run to react upon the value of the shares, and suggested that they would do well to consult the Danish State Railways, which were at the present moment engaged in dealing with the same problem.

Mineral Rates

Mr. Montagu Smith thought that a simplification of mineral rates applying to domestic traffic would save the railways and others thousands of pounds even if the private householder had to pay another 1d. a ton for his coal. As to industrial traffic applying to blast furnaces, iron works, power stations, gas works, &c., special rates were already quoted, many running from year to year, so that there was no difficulty in dealing with that traffic, which, he thought, should be left in the hands of the railway companies, and reference to the Railway Tribunal washed out.

Mr. Farquharson remarked that although hotels, restaurants and refreshment cars had done £88,000 more

business in the last year, the total net profit even with this enhanced amount was £125,000 for the whole year. The return seemed to him insufficient, and he asked the board to consider whether it would not be more advantageous to let these premises and these businesses as going concerns to contractors. He further suggested the issue of books of tickets to families living within 20 or 30 miles of the large cities. He thought that if such books were issued at a price something between the ordinary season ticket rate and the daily return fare, the result would be increased suburban traffic and the possibility of filling and rendering profitable some of the mid-day trains which were at present running at a loss.

Mr. Inglefield thanked the Chairman on behalf of the British Railways Stockholders' Union for the kindness and courtesy he had always extended to the Union. They were glad to hear that he was not in favour of wholesale electrification of the British railways. This was now being made a political move, and the railways had been for too long in latter years the plaything of the Government and the politicians.

Mr. W. C. P. Tapper, as a stockholder not connected with the Railway Stockholders' Union, desired to express his extreme disappointment at the presumably authorised statement which had appeared in the press on the subject of the electrification of the L.N.E.R. This was the biggest issue facing the company, and the longer the Directors evaded it the worse it would be for the company, the stockholders, and the travelling public. If there was one place in the world where electrification was certain to pay and where it was most needed it was Liverpool Street, and the suburban traffic from that station, and that part ought to be proceeded with at once. Never again would the company be able to raise money so cheaply as now. In view of the statement that the expense of widening the line from Liverpool Street to Stratford would be too great, he asked whether a double-deck railway between these points would be considered.

Mr. Leather asked what was the rate of interest on the savings banks, superannuation and pension funds. He had been told it was 4 per cent., and thought this rate of interest should be reconsidered.

Chairman's Reply

The Chairman: I was asked if we could spread £538,000 over several years. The answer is, No, the expenditure will, I expect, continue this year and next year. Mr. Miller is rather hard on our canals. After all, our canals are still involving us in a loss of some £9,000, but when we started business they were costing us a loss of nearly £50,000, so that we are now a great deal better. It is not merely a question, as I have explained here before, of closing canals. We cannot close canals without Parliamentary authority. We are endeavouring just now to get power to close part of a canal at Grantham; it is coming up at the special meeting; and we always do our best to get rid of them, but to get rid of a canal is just like getting rid of any other old man of the sea who hangs round your neck.

In reply to Mr. Miller, I have explained already in my speech that the companies were considering that they could not get beyond the £40 limit. It is, of course, possible to go back to the old method of carrying parcels, and we might get some more parcels traffic conceivably, but at an enormously increased cost, and the reduced cost of the carriage forward arrangement is so great that I do not think there is any prospect of our going back to the old arrangement.

I think it was Councillor Wilson who spoke about the great success of the penny-a-mile fare. Let me remind you, I did not speak of the great success of it. I said that the receipts and cost had about balanced, but that we had saved no doubt the loss of a great many other passengers. It will not do to talk about it as a "great success" just at present, and as a reason why we should go bald-headedly to reduce other fares and other rates.

I am sorry that Mr. Armstrong felt there was any lack of sympathy on the part of the board with reference to anyone who has suffered or been in any danger in connection with

either the Wormley accident or similar accidents which have occurred. The question of occupation crossings is an extraordinarily difficult one; it involves many difficult legal questions, and therefore it is not suitable for discussion at a public meeting. I do not feel able to discuss it.

Mr. Montagu Smith gave us a very interesting talk about mineral rates. I must admit myself incapable of dealing with him or any other expert. Rates for carriage is a matter which must be discussed with the Chief General Manager and not at a meeting of this kind, because it is wholly an expert business.

Mr. Farquharson had a good deal to say about our hotels. We have some hotels let, and we have tried to sell some of them, but have failed. I think he puts rather a high figure upon what we could sell our hotels for.

Mr. Tapper talked to us about the Great Eastern Railway suburban traffic. The position is this: that the whole question of how suburban traffic is to be conducted has passed out of the hands of this board; it is in the hands of a joint committee which is composed of representatives of the London Passenger Transport Board and representatives of the four main line companies. It is their policy which must govern all suburban traffic questions, and it is not a matter with which I, as Chairman of this company, have anything to do. Just for the same reason, we are not thinking of making a double-deck station at Liverpool Street.

The interest allowed on Superannuation Funds is 4 per cent.; in nearly every case that is the statutory figure.

High Speed Trains

There is one other question I had sent to me. I had a request made to me to say something about the running of high speed trains. The preliminary report already received upon the run between King's Cross and Newcastle on Tuesday last, added to the report on the previous run between London and Leeds, is so encouraging that we shall give our immediate consideration to the question of putting on one such train to run between King's Cross and Newcastle during the autumn.

There are many details requiring careful investigation before a final decision can be arrived at. If such a train is run it would be appropriately named the Silver Jubilee train, though for a variety of reasons it will not be possible to include it in this year's summer timetable.

I read the motion to you before; I will read it again: "That the report of the Directors with relative statement of accounts for the year ended December 31, 1934, be received and adopted." That motion has been seconded.

On being put to the meeting, the motion was carried unanimously.

I now move: "That dividends be now declared in terms of Account No. 9 headed 'Proposed Appropriation of Net Revenue'; that the dividends be payable (under deduction of Income Tax). Less:—(1) The amounts paid as interim dividends appearing in Account No. 9(a) headed 'Statement of Interim Dividends Paid'; and (2) the balance paid on February 15 last of the dividends on the first and second guaranteed stocks—by warrants on March 14 to the proprietors registered in the books of the company at the close of business on January 30, 1935, and that warrants be sent by post on March 13."

Sir Murrrough John Wilson: I beg to second that.

The Chairman: The motion has been moved and seconded.

On being put to the meeting the motion was carried unanimously.

The following were then re-elected Directors of the Company: Sir Charles C. Barrie, K.B.E., M.P., Mr. A. Harold Bibby, D.S.O., Mr. Oliver R. H. Bury, Major W. H. Carver, M.P., Sir Christopher T. Needham, Mr. Frederick L. Steel, Sir Gerald F. Talbot, K.C.V.O., C.M.G.

Sir Albert W. Wyon, K.B.E., F.C.A., was re-elected as an auditor.

Mr. Barber-Fleming then read a resolution to the effect that any stockholder qualified as a proprietor to attend and vote at the annual general meeting of the company should be entitled, on the occasion of the meeting, to a return ticket at the same cheap fares as were granted to members of the public attending public gatherings, conferences and

the like, and that the General Manager be requested to arrange for the necessary interchange of facilities with the other British railway companies.

A shareholder asked the Chairman if he had anything to say about the future. This was the fourth meeting of the four great companies, and he thought he was the only Chairman who had not said something with regard to the future.

The Chairman replied that the chairmen of other companies had uttered opinions with reference to the probable prosperity of trade during the current year; some perhaps more hopeful than others. He was speaking later than they did, and was bound to say that in their districts trade since the beginning of the year had somewhat, not a great deal, fallen off, and he was unable to say what the course of trade was going to be during the rest of the year.

With regard to Mr. Barber-Fleming's motion, he pointed out that shareholders could already benefit by the arrangement whereby persons of a minimum number of 100 attending conferences might by pre-arrangement travel at single fare and one-third with availability of one calendar month. That was the same level of fare as applied to the monthly return ticket, a facility which was open to any member of the public and of which any stockholder was free to avail himself. The other companies had all declined to accept this resolution, and it would be obviously impossible to make an exception.

On being put to the meeting the motion was defeated by a large majority.

SPECIAL GENERAL MEETING

A special general meeting of the London & North Eastern Railway Company was held at the Wharnccliffe Rooms, Hotel Great Central, N.W.1, on Friday, March 8, Mr. William Whitelaw (Chairman of the company) presiding. The Secretary, Mr. James McLaren, read the notice convening the meeting.

The Chairman: This is the Bill to which reference is made in paragraph 12 of the report of the directors. It is a short and very simple Bill which will not involve the company in any capital expenditure and may be the means of saving a certain amount of annual expenditure for which the company is now liable. The necessity for promoting the Bill lies in the fact that our powers to charge the post-war charges in respect of our canals (which depend upon certain Orders of the Minister of Transport made under emergency legislation) will cease at the end of the year, and if these powers be not renewed as proposed by the Bill we shall have to revert to our pre-war charges, with the result that the loss at present incurred on the company's canals will be increased. The company is also under a statutory obligation to keep its canals open and navigable for the use of traffic offering. In the case of the Grantham Canal there has not for many years been more than a negligible amount of traffic, and for some five or six years there has been no traffic at all. Meanwhile, in pursuance of the statutory obligation to which I have referred, the company has had to spend a considerable amount of money each year in keeping the canal in a condition to carry a traffic which does not present itself. A provision has accordingly been included in the Bill to relieve the company in the case of this canal from unnecessary maintenance expenditure.

Another matter with which the Bill deals is the closing of the level crossing of the Lincoln to Gainsborough Road at Saxilby and the swing bridge over the Foss Dyke adjoining that level crossing. Arrangements are being made under which the road in question will be diverted and carried by a bridge over the railway and the Foss Dyke at the cost of the local authorities and the Road Fund. As soon as this diversion is completed the level crossing and the swing bridge can be closed, and the Bill provides accordingly.

With regard to the London Passenger Transport Board Bill, it is necessary for you formally to approve this Bill in so far as it relates to certain widenings and alterations which it authorises the London Passenger Transport Board to make in the railways of the Metropolitan and Great

Central Joint Committee between Harrow and Rickmansworth. The Bill is promoted by the London Passenger Transport Board and contains a large number of other powers with which we are not at the moment concerned. But it confers both upon the company and the Metropolitan and Great Central Joint Committee power to make agreements with the London Passenger Transport Board with regard to the construction and ownership of the widened and altered railways of the Joint Committee, and the application of moneys by the company and the joint committee to the purpose of any agreement entered into with the board, and to this extent requires your approval before it can proceed. Your directors are of the opinion that the proposals of the Bill are, on the whole, likely to be of advantage to the company.

The Bills were approved and the proceedings terminated.

The L.N.E.R. in 1934

The following is the review of the L.N.E.R. company's business during 1934 referred to by the Chairman:—

The improvement of the trade of the country which began towards the end of July, 1933, continued and developed up to the end of 1934, the year under review. During the first six months our merchandise traffic of all classes increased by £829,000 or 11.45 per cent., and the coal and coke traffic by £592,000, or 10.94 per cent. An increase of £58,000 in passenger train traffic for the same period brought the total increase in railway receipts for the first half of the year up to £1,479,000. As was to be expected, these rates of increase in freight train traffic were not continued in the second half of the year, the comparisons being then made with the improved receipts of the latter part of 1933. The following table shows the railway traffic receipts and the increases and decreases in the years 1929, 1933 and 1934:—

	Passenger	All Merchandise and Livestock	Coal and Coke	Total
	£	£	£	£
1929	19,097,000	21,853,000	14,132,000	55,082,000
1933	15,771,000	15,408,000	11,139,000	42,318,000
1934	16,161,000	16,472,000	11,905,000	44,538,000
Increase—1934 over 1933	390,000	1,064,000	766,000	2,220,000
	=2.47%	=6.91%	=6.88%	=5.25%
Decrease—1934 with 1929	2,936,000	5,381,000	2,227,000	10,544,000
	=15.37%	=24.62%	=15.76%	=19.14%

The tonnage of freight traffic carried in 1934 has increased by 10,279,000 tons or 9.02 per cent. over that of 1933, and the number of passenger journeys (excluding season tickets) was 6,136,000 or 3.28 per cent. higher. The freight engine miles showed an increase of 4,891,000 or 6.03 per cent., and the passenger engine mileage an increase of 2,634,000 or 3.54 per cent. The penny a mile third class fares for return within one month have now been established as regular fares, and corresponding first class fares have been fixed at 1½d. a mile.

Rolling Stock Policy

As foreshadowed in the review of last year the revenue has been debited with increased expenditure upon rolling stock. For some years past the directors have reduced the expenditure on rolling stock as far as was possible since, in view of the great decrease in traffic receipts since 1929, there was some doubt as to the extent of our ultimate requirements. The policy of the board has been to maintain in efficient condition the requisite amount of rolling stock of all kinds for the traffic offering, but the considerable improvement of trade during the last eighteen months has altered the position and made the provision of new rolling stock imperative. The changing conditions of modern traffic and the increased rapidity of transit required for merchandise make it necessary to reconsider the type of new rolling stock to be built. In place of the slow-moving freight trains with loose couplings an urgent demand for trains fitted with automatic brakes has arisen, thus necessitating improved types of both engines and wagons.

A similar situation has arisen with respect to passenger coaches. Here an improved type of vehicle is necessary if our progress in recovering passenger traffic is to be main-

tained. We are reaping the advantage of building new stock at a time when we are in possession of more definite knowledge of modern requirements and are able to design locomotive, carriage, and wagon stock not only in the light of recent experience but with a much fuller knowledge of the most up-to-date methods of design and construction. We propose not only to increase our expenditure on building new rolling stock chargeable to revenue, but also to utilise part of our railway renewal funds for the same purpose. Our railway renewal funds are divided into three classes, viz., way and works, rolling stock, and other miscellaneous funds. The way and works fund was larger than required, and we have transferred £2,000,000 from this fund to the rolling stock fund and we propose to use this latter fund as may be required from time to time for the purpose of our rolling stock building programme.

Among new types of rolling stock built by the company last year the outstanding one is an eight-coupled passenger locomotive designed to eliminate the double-heading of our heavy trains on severe gradients and in particular on the very difficult line between Edinburgh and Aberdeen. This engine has been most successful in performing the work allotted to it, and a second engine differing only in a few details has been put into traffic. In view of the importance of ascertaining everything that science can teach regarding locomotive design and construction the directors decided that the first of these engines having completed all the trials which could be carried out in this country should be sent to the locomotive testing station at Vitry, near Paris, and submitted to the most searching tests that recent development of science can apply. We believe that we shall obtain some valuable information from these tests and we are delaying the completion of the other four engines of this type which are under order until the full report has been received regarding the one under trial. It may be a matter of interest to many of the stockholders to know that the tractive effort of this locomotive, bearing the name of the *Cock o' the North*, at 85 per cent. of the boiler pressure is 43,462 lb., and the total adhesive weight 180,544 lb., which compare with 32,909 lb. and 148,176 lb. respectively of our largest Pacific engine.

Some anxiety is believed to exist among stockholders who read from time to time of very large expenditures on which the company is stated to be about to embark. These figures as sometimes quoted include the amounts normally expended each year for the proper maintenance of the whole undertaking of the company, a type of expenditure without which no railway company can be carried on. Capital expenditure sanctioned by the board is adopted for one of two purposes—the securing of economy in working or increase of revenue. Proposals for expenditure of this nature are in the first place submitted by the divisional general managers or heads of departments to our Chief General Manager and only after his scrutiny do they come before the appropriate committee of the board. Since the formation of the company up to the end of 1934, 1,543 schemes of this kind have been passed by the board; they have cost £4,774,000 and have resulted in an annual saving of expenditure amounting to £1,052,000 and an annual increase of revenue of £190,000, thus yielding a return of 26 per cent. on their actual cost. The most obvious schemes were, of course, taken in hand first of all, but those reported upon during the last two years have yielded a return of nearly 17 per cent.

Road Service Investments

The total investment of the company in passenger road traffic through our associated omnibus companies at the end of 1934 amounted (at cost, including stamp duty) to £2,434,772. The dividends and other sums received during the year totalled £193,999, representing a return at the rate of 7.97 per cent. for the year, compared with 7.11 per cent. in the previous year. Some of this revenue was in respect of capital held only for part of the year, and the whole represents an equated annual return of 8.1 per cent. per annum. In addition the net savings accruing to the company from the closing of branch lines for passenger traffic, and reductions of train services rendered possible by the employ-

ment of omnibus services, amounted during the year approximately to £93,000.

During the past year the policy of modernising and increasing our goods motor fleet has been continued. At the close of the year the number of parcels and goods road motor vehicles in use was 2,791, compared with 2,267 at the end of 1933. The total number of motor vehicles, the provision of which has been authorised by the directors since January 1, 1934, is 771, but these had not all been delivered by the end of the year. Further schemes of mechanisation of our cartage equipment have been sanctioned, involving the replacement of 562 horses by 373 motors. This process of conversion, coupled with the general expansion of the motor fleet, is not only enabling us to conduct our cartage work more economically and efficiently, but to provide quicker service and to meet more effectively the growing demand for door-to-door transport of merchandise traffic by rail and road. Special attention has been given to the needs of agriculture, the cartage services provided by the company in connection with the Royal Show at Ipswich in 1934 being entirely mechanical. In this connection also, additional equipment has been provided for handling livestock traffic, and a special vehicle for the conveyance of milk in bulk, capable of being transferred direct from road to railway truck, has been successfully introduced. Under the provisions of the Road and Rail Traffic Act, 1933, the licensing system for goods motor vehicles came into operation during the year. The Act includes within its scope the whole of the goods road motor vehicles owned by the Company, and, with certain minor exceptions, the Company's applications for licences have been granted.

Harbour Undertakings

The year 1934 saw the completion of two important schemes in connection with the company's Dock and Harbour Undertakings. On October 1, 1934, the Parkeston Quay extension, one of the works carried out with Government aid under the Development (Loan, Guarantees and Grants) Act, 1929, was formally opened by Admiral of the Fleet Sir Reginald Tyrwhitt, G.C.B., D.S.O., and on October 4, 1934, the new fish dock at Grimsby was formally opened by Lord Rushcliffe.

The experiment, commenced in the North Eastern Area in 1933, of providing camping coaches at suitable stations on the company's system was extended during 1934 by the provision of 35 coaches, and met with such success that it is proposed to convert and equip 30 more coaches for use during 1935. Certain officers of the company have examined the conditions under which very high speeds for passenger services have been established in Germany, and after carefully considering the possibility of running trains at similar speeds under the conditions prevailing in this country a test was carried out on November 30. A train weighing 147 tons on leaving London and 207 tons on the return journey was scheduled to run the distance of 185 miles between King's Cross and Leeds in 165 minutes. The journey to Leeds was accomplished in 151 minutes and the return journey with the heavier load in 157 minutes. The locomotive was *Flying Scotsman*, one of our Pacific engines, built in 1923, and while the test was mainly valuable for showing the high speed which could be maintained on a long up gradient, other features of it were that a speed of 100 miles per hour was attained at one point, and that it was demonstrated that such a run be made by a well-designed steam locomotive using our native fuel—coal. The coal consumption was about 6½ lbs. per mile higher than the average consumption of our Pacific engines stationed at King's Cross. We propose to make a further test on runs between London and Newcastle in order to obtain further information but we do not propose to introduce any such service into our timetable until the information obtained from the experiments has been carefully examined.

The expansion in the iron and steel industry, of which mention was made last year, continued during 1934. The improvement was most marked in the Frodingham and Scunthorpe district, where the volume of traffic handled by the company during the year exceeded that for 1929. The increased activity in the Clyde shipyards during 1934 was

an important factor in the spread to Scotland of the revival in the iron and steel industry which had previously been confined to England. There has been definite advance in the shipbuilding industry, as measured by the increase in vessels launched, and there has been a reduction in the number of ships laid up. In the Clyde area there were laid up at the end of the year 14 vessels with a net tonnage of 75,360, as compared with 32 vessels with a net tonnage of 143,210. At the end of 1934 there were 67 vessels with a N.R.T. of 135,831 laid up in the Tyne, compared with 106 vessels of 240,259 N.R.T. in 1933, a reduction of 39 vessels and 104,428 N.R.T. The outlook for 1935 is fairly hopeful, and the Government's proposals for the subsidising of tramp steamers and for making advances for the building or modernising of cargo vessels may be expected to assist this industry.

Coal Traffic

The coal mining industry made considerable progress during the year. This was due to the increased demand for industrial purposes, notably for the iron and steel trade, as well as to increased shipments resulting in part from the trade agreements with certain North European countries, though exports suffered a setback through the German exchange difficulties. The total output of the United Kingdom was about 221 million tons, an increase of nearly 14 million tons over 1933. On the other hand, this figure was still 37 million tons below the 1929 output. The recovery in Northumberland has been most marked, where the output exceeded that of 1930, while in Scotland the production was over 31 million tons, an increase of more than 2 million tons compared with 1933. Substantial increases were also recorded in Durham and Yorkshire. The revival in trade during the year, and particularly the increased shipments of coal from the North East Coast and Scottish ports, have resulted in the net receipts from our docks, harbours and wharves at £151,342, showing an improvement of £55,753 on 1933, though this is still £47,000 below the figures for 1929.

Although our steamships accounts reveal a debit balance of £97,538, there was an increase in the volume of both passenger and freight traffic carried by our Continental steamship services during the year. The number of passengers conveyed by all the regular steamship lines via Harwich shows an increase of 11 per cent. compared with 1933, the L.N.E.R. services proper showing an improvement of about 7 per cent. despite the restrictive influence of currency regulations in Central Europe. Harwich and Grimsby cargoes were better than in 1933 by 8.7 per cent., but unfortunately the increase was almost entirely in traffics carried at low rates. The estimated railway receipts derived from the steamships traffic amounted to £409,000.

The general improvement of trade and the increase in passenger traffic have materially increased the net receipts of our hotels, refreshment rooms and dining cars. The net receipts for the year were £39,644 higher at £125,325. This result shows a great improvement on any of the last three years, but it is still far below the results of 1929 and 1930. The reconstruction of our hotel at Hull will not be completed until the middle of the summer, the necessary work having proved to be much more extensive than could be foreseen before the alterations commenced; business in the hotel is being successfully carried on during the progress of the work. The modernisation of our hotels will be very nearly completed when the work at present in hand at our Glasgow, Aberdeen, and Cruden Bay hotels has been finished.

G.E. Electrification

A question which has received some prominence during recent months is that of the electrification of our Great Eastern suburban service. Various schemes for electrification had been put forward to the old Great Eastern Railway, but none of them was found satisfactory. The directors have been, and are, fully conscious of the serious overcrowding which exists in the service at rush hours, and immediately after amalgamation addressed themselves to the solution of this problem. They had several fresh schemes for electrification prepared, but the initial and principal difficulty was that the existing lines between Liverpool Street and Stratford were already fully loaded and were carrying the heaviest

suburban service, steam or electric, to be found anywhere in the world. No intensification of the service could be obtained to justify electrification, except by a further widening of the lines between Liverpool Street and Stratford and a re-arrangement of the slow and fast lines by means of a fly-over. These works were estimated to cost £3,000,000 apart altogether from expenditure on electrification proper. Apart from this the traffic to be handled was of a peculiar character—very heavy during the rush hours morning and evening, relatively light at other times. The total expenditure involved would amount to £7,000,000 and no adequate return could be expected on the outlay. The existence of keen competition by road, and the possibility of competition by tube in other hands, had also to be considered, as such competition would have effectually destroyed any prospect of ultimate fructification of the expenditure. The possibility of a tube scheme was also considered, but here again the expenditure involved was heavy, and the net return negligible.

Suburban Traffic Developments

The directors came to the conclusion that in the absence of a pool of competing interests and of substantial Government assistance, electrification of the Great Eastern suburban lines could not be other than a losing proposition, which the financial circumstances of the company did not allow them to undertake. They accordingly turned all their attention to the improvement of the existing steam service, within the limits of what was financially possible to them. The company has done its utmost year by year to improve the rolling stock used on the Great Eastern suburban service. Since amalgamation 59 new trains have been provided for the suburban services of the Great Eastern section; 11 of these are now working in the Ilford service, 34 in the Enfield and Chingford services, and 14 in the Hertford service. Fifty-one of the new trains are of articulated stock, and all are of modern design. The carriage building programme for 1935 includes the provision of twelve new suburban trains, which will complete the equipment of the Great Eastern suburban area with bogie stock. During the same period the company has spent one million pounds in widening the suburban lines between Romford and Shenfield, a distance of 8½ miles. These works have enabled it to increase the mileage of the Great Eastern suburban services by upwards of 200,000 miles per annum, whilst at the same time it has improved medium distance services from places such as Southend and Clacton. There has been an increase of 13 per cent. (almost 600,000 miles per annum) in the mileage of the suburban service since 1922. It is not possible to make further improvements in the speed, capacity, or intensity of the steam service without heavy expenditure in widening the lines between Liverpool Street and Stratford, and providing fly-over junction near Ilford. The question of electrification now rests with the Standing Joint Committee representing the London Transport Board and the four main-line companies. All details of the proposal have been submitted to this committee, and the decision now lies entirely in its hands. In the meantime the L.N.E.R. will of course continue to use every endeavour to carry on the existing service with punctuality and efficiency.

Ferry Services

A scheme has been approved for the modernisation of the Humber ferry service between Hull and New Holland, where the existing terminal accommodation was unsatisfactory. The provision of a floating landing-stage with inclined approaches will shortly be taken in hand by the Hull City Corporation and this company will furnish corresponding accommodation at New Holland. Two new ferry steamers, which cost approximately £53,000, have been built for the company and are in service. They are giving every satisfaction. The working of the Queensferry Passage has been leased on satisfactory terms to Wm. Denny & Bros. Ltd., Dumbarton. The lessee operates the service with two new diesel-electric ferry boats constructed by that company and the greater frequency of the sailings has attracted an increased traffic to the ferry. The adoption of diesel-electric propulsion for paddle-ships is a new departure in shipbuilding practice. The system offers considerable scope for reducing

the amount of space required for the engines and thus increasing the area available for passengers, and when the replacement of the Clyde steamer *Talisman* came up for consideration last year it was decided to place an order for a diesel-electric vessel with direct drive to the paddles.

The percentage deductions from salaries and wages which applied from March, 1931, to all grades of the company's staff following the serious fall in the company's revenues, were during 1934 the subject of negotiations with the trade unions concerned. The deductions, subject to certain minima and modifications so far as workshop employees are concerned, were 2½ per cent. on all earnings, with a further 2½ per cent. on earnings in excess of 40s. per week. The directors were of opinion that the financial position in July last did not justify any modification upwards in the rates of salaries and wages, and that there was no immediate prospect of such an improvement in the net revenue position as would justify such an alteration. They however accepted the decision of the majority to make an agreement with the unions for a discontinuance of portions of these deductions from October 1, 1934, and January 1, 1935. Subject to certain minima, a general deduction of 2½ per cent. is now applicable to the earnings of staff in all ranks.

GREAT SOUTHERN RAILWAYS COMPANY, IRELAND

Absorption of road transport undertakings— Increased rolling stock expenditure—Terminal improvements

The annual general meeting of the Great Southern Railways Company was held on Friday last, March 8, at the Gresham Hotel, Dublin, Sir Walter Nugent (Chairman of the company) presiding.

The Chairman said that but for the existing unfortunate labour troubles his remarks might have been limited to a presentation—and a cheerful presentation on the whole—of the work of the company during the past year. This was the first annual meeting since the election of the newly constituted board and the absorption of the road transport companies, following the passing of the 1933 Act. There had been an improvement in working receipts under almost all headings. The road services, both passenger and freight, were now welded into one compact concern. All scattered offices and premises were being disposed of, and in future the entire road transport administration would be located in new premises, now nearly complete, known as Transport House, Bachelor's Walk.

The gross railway receipts had increased proportionately with the road services, and, when the full result of the unification of control had had time to fructify, further increases of revenue were expected. The demands of traffic both by road and rail had necessitated the building of many new wagons and road vehicles, and the consequent drain on cash resources had been very great. It was satisfactory, however, to note that all expenditure made under these headings had been at once remunerative. The new beet factories and flour mills had been sources of increased revenue, and it was hoped in the current year that receipts would be further supplemented by an improvement in the number of live stock carried; which the new understanding with Great Britain has made possible. The reduction in the number of live stock carried in the last few years was:—

	Number carried	Receipts £
1928	2,753,708	537,058
1934	1,476,356	248,651

The gross receipts for the year (excluding road transport) were £3,152,781 compared with £2,981,408 for 1933, showing an increase of £171,373. The expenditure (excluding road transport) was £2,833,160 compared with £2,674,539 for 1933, showing an increase of £158,621. The receipts from railway passengers showed an increase of £24,750. Parcels and Mails showed a net decrease of £1,960, leaving an increase of £22,790 on passenger train traffic. Receipts from

goods train traffic showed a net increase of £137,797 after allowing for a decrease of £24,745 in live stock. The tonnage carried by rail was 2,473,637 tons, or 368,240 tons more than in the previous year. Some 402,290 passengers travelled on special excursion trains during the year, showing an increase of 4,407 excursionists over 1933, and increased receipts from this source of £2,882. In merchandise traffic, there was a gratifying increase in the tonnage carried of 146,714 tons compared with 1933. The further extension of Collection and Delivery Services which had taken place, and the excellent facilities now at the disposal of the trading public had materially contributed to this increase. The results of hotels working for the year showed a small increase over last year—the figures being a profit of £7,891 for 1934 as against £6,609 for 1933.

Renewals and Maintenance

Increases in revenue were secured only by corresponding increases in expenditure. It was too often assumed that increased receipts connoted profits to the same extent, but from a net revenue aspect only a small percentage of gross traffic receipts remained after providing for the necessary expenditure. The wages bill for all departments totalled over £2,000,000 per annum and represented 65 per cent. of gross expenditure. The total expenditure on permanent way and works charged to Abstract "A," including maintenance of signalling and telegraphs showed a decrease of £1,215 compared with 1933. During the year 30½ miles of track was relayed, and 27½ miles of re-sleepering was carried out, as compared with 24 miles of relaying and 40½ miles of re-sleepering for 1933. Among bridge renewals, a work of considerable magnitude was undertaken in the renewal of the bridge carrying the railway over Lough Atalia near Galway. About one-half of the entire work was completed by the end of 1934. The extensive siding accommodation with an aggregate length of some 16 miles provided at Thurles, Mallow, and Tuam in connection with the new beet factories had involved the company in considerable expenditure.

Signalling Developments

A new central signal-box with colour-light signalling, had been provided at Amiens Street, thereby enabling the Great Southern box and the joint working of the Great Northern box to be dispensed with. The saving amounted to £500 p. annum. Signal-boxes had also been provided at Thurles, Mallow, and Tuam in connection with the new sugar factories, while necessary signalling alterations had been carried out in the beet-growing districts. Continuing the policy referred to at previous meetings, further economies had been secured by the extension of the use of national electric current in substitution for steam pumps, and also for station lighting.

The total revenue expenditure in the locomotive, carriage and wagon department, including locomotive running expenses, amounted to £1,185,000, showing an increase of £95,718, due chiefly to additional mileage in connection with beet traffic. The year 1934 had been an abnormal one in the locomotive department. It had witnessed the completion of the company's scheme embracing the building and equipment of modern locomotive shops at Inchicore, and also the establishment of up-to-date shops at Broadstone for the construction and overhaul of all vehicles required for the road transport side of the business. The anticipated increased efficiency had already been realised, and during the unprecedented demand for locomotive power and for wagons at the height of the beet season the output from the works was doubled. In addition to the output of railway rolling stock, 30 single-deck buses, 6 double-deck buses, and 4 luxury coaches were built in the works. The total train miles worked by locomotives during the year was 9,094,061, compared with 8,657,528 miles in 1933, showing an increase of 436,533 miles. Some 227,000 tons of coal were imported during the year and, in addition, experiments were being made with Arigna coal. In furtherance of the Government scheme to develop the use of turf, it was used at 290 of the company's stations.

The accounts for 1934 contained a new and interesting feature in Account No. 11, namely the whole of the receipts and expenditure of road transport operations. In previous years the figures under the head of road transport had represented net balances only, received or paid, under working agreements with undertakings which were not part of the Great Southern Railways Company. During the past year considerable extension had taken place of road merchandise services operating from railhead at various railway stations, and a number of direct door-to-door road services had been instituted. July 1, 1934, was the day appointed by the Minister for Industry and Commerce for the operation of that portion of the Road Transport Act, 1933, which required every person carrying on a merchandise road transport business to hold a licence granted by the Minister. The licences of 15 of the largest road transport companies in the Free State had already been transferred to the Great Southern Railways Company, and they were in negotiation with some 60 other road competing firms. Failing agreement as to purchase price, arbitration was available to either side.

Junction Line in Dublin

For many years changes had been contemplated to improve and cheapen railway traffic to and from the Dublin termini. The alterations contemplated at Broadstone making it the chief operating depot and repairing shops for road vehicles formed part of that scheme. The only expenditure of any magnitude in connection with the scheme was the cost of connecting the old Great Southern and Western link line with the Midland Great Western section where the two lines ran in close proximity to each other between Cabra and Amiens Street. This would give passengers from the Midlands and West of Ireland direct connection to the centre of the City, and to the Dublin and South Eastern section of the railway. The cost of making the junction, which was estimated at £18,000, would result in substantial savings which more than justified the expenditure.

They had separated the additions to Capital Account No. 4, arising under the merger of the road transport undertakings in process of liquidation at the end of 1933, from the capital expenditure incurred during the year 1934, and also transferred the additions under the merger to depreciation fund on the credit side of the account, in order to complete the scheme of capital adjustment provided for in the 1933 Act. The expenditure on additions in the year was £281,103. The principal new works in the year were:—

New shops at Inchicore	£62,673
New sidings to beet factories and other small works	19,030
Road transport premises	41,605
Payments on account of acquisition of road transport undertakings	40,713
New omnibus and goods road vehicles	119,210

Expiry of Baronies Grant

The sum of £47,000 received from the Government annually under Section 63 of the Railways Act, 1924, in respect of Baronially guaranteed lines was no longer forthcoming. The Gross receipts of these lines never covered the cost of working. The interest on the capital by which they were built was guaranteed by the Baronies, and the onus of payment of dividends was laid on the company by a transfer of stock under the provisions of the Railways Act, 1924. The payment by the Government to the company of £47,000 per annum for 10 years was an admission that a burden had been placed on the company by the compulsory absorption of these lines as part of the Great Southern Railways Company, but, in spite of strong protests, the Railways Act, 1933, failed to provide for a continuance of these payments.

The result of the year's working under all headings had shown considerable improvement, and the outlook for the future was, to say the least of it, more hopeful. Out of increased earnings they recommended that the portion of the arrears of guaranteed preference dividends for the year 1932 be paid. They still had very heavy arrears of maintenance to make up before any satisfactory and permanent improvement could be shown in net revenue.

Retired Railway Officers' Society Luncheon

Mr. William Whitelaw the guest of honour at the half-yearly luncheon held on Monday last

The half-yearly luncheon of the Retired Railway Officers' Society was held at the Abercorn Rooms, London, last Monday. The new President, Mr. W. F. Pettigrew*, M.Inst.C.E., M.I.Mech.E. (formerly Locomotive Superintendent, Furness Railway), was in the chair, and Mr. William Whitelaw (Chairman, L.N.E.R.) was the guest of honour. Among the large attendance of members and guests were the following:—

Messrs. H. D. Anderson, T. E. Argile, S. L. Baister, V. M. Barrington-Ward, C. Bassage, A. R. Bell, A. J. Brickwell, A. Brittlebank, C. J. Brown, A. H. Bull, A. L. Castleman, R. F. C. Castleman, G. J. Chesters, T. Christopher, A. Clear, E. A. Clear, Gordon Clear, C. E. Cockburn, G. Cole Deacon, F. C. A. Coventry, G. L. Darbyshire, F. W. Dingley, A. E. Dolden, P. J. Dowsett, H. W. C. Drury, A. F. Dymant, J. W. Faulkner, H. Ferguson, E. Ford, L. E. Ford, H. E. Frost, O. C. Gatenby, E. Goulborn, H. Goulborn, H. N. Gresley, B. Griffin, H. J. Guest, T. E. W. Guest, W. E. Hart, E. B. Hassall, E. L. Hawkins, G. T. Hedge, J. Hill, A. B. Holloway, G. Hughes, W. H. Hyde, R. J. M. Inglis, T. W. Jacobs, W. A. Jepson, S. F. Johnson, J. A. Kay, K. Kerr, D. R. Lamb, F. W. Lampitt, E. J. H. Lemon, Capt. Lines, Messrs. J. W. Lovejoy, J. Maclaren, Dr. MacMahon, Messrs. H. Marriott, A. Maynard, E. W. Mauger, Lt.-Col. P. D. Michôd, Messrs. H. P. Miles, A. S. Mills, F. V. Milton, T. Moffett, J. R. Morris, G. Morton, S. L. Murgatroyd, P. Nadin, C. W. Neele, E. A. Neele, C. H. Newton, R. H. Nicholls, A. P. Parker, C. P. Parker, L. P. Parker, H. W. Payne, F. K. Pelly, W. F. Pettigrew, J. Pike, D. Poyntz Ricketts, E. Prebble, P. H. Price, J. Procter Smith, A. Puleston, E. Rhodes, C. A. Roberts, S. Roberts, P. Ross, J. Roughton, R. Rowbottom, H. J. Rudyard, J. T. Ryan, F. A. Sargent, J. Sayers, J. B. Scattergood, G. G. Senior, J. Shearman, T. H. Shipley, C. F. Slade, T. Smith, D. Spooner, W. A. Stanier, G. Sutherland, Lt.-Col. Gilbert S. Szlumper, Messrs. M. C. Tait, E. Taylor, W. A. Thomas, H. Thompson, G. F. Thurston, G. Tipton, W. T. Venton, A. Walker, G. J. Walker, H. C. Walton, J. Wardle, Major H. A. Watson, Messrs. H. Wheeler, William Whitelaw, J. Williams, J. S. Wilson, W. J. Yates, Captain Zohrab.

The Chairman, in proposing the toast of "The Guests," welcomed the visitors, and expressed the pleasure of the society in having with them Mr. William Whitelaw, whose extraordinary interest in everything connected with staff welfare was well known. Another guest, Sir Herbert Walker, would be remembered by many of those present from his L.N.W.R. days, while all knew the great work he had done on the Southern. Among their other visitors were Mr. H. N. Gresley and Mr. W. A. Stanier, who were known to them all by the *Cock o' the North* and the *Princess Royal*. Referring to the record breaking run on the L.N.E.R. on March 5, the Chairman described it as a great credit to this country. They were also glad to welcome Lt.-Col. Gilbert S. Szlumper and Mr. E. J. H. Lemon, to whom a wonderful tribute had been paid by the Chairman of the L.M.S.R. at the company's meeting.

* A portrait of Mr. Pettigrew is reproduced on page 520 and a brief biographical note on page 521 herein.

Mr. Whitelaw, in replying, discussed the subject of railway relations with the public, and emphasised the need of close personal contact. Punctuality was of great importance. He mistrusted punctuality averages, and was more interested in the timekeeping of the principal trains; from which that of connectional services would follow. The cleanliness of carriages was another point in public criticism of the railways, but travellers did little to assist the companies by minimising litter or closing the windows of compartments on leaving them empty in order to exclude the dirt of tunnels. Overcrowding was due in part to concentration at the front and rear of trains so as to be near station exits on alighting, and in any case was no worse than that on the tube railways, which seemed to escape criticism because their underground situation hid them from critical observers. There was a demand for brighter waiting rooms, and it would be a good thing if the companies could close down those which were not essential and concentrate on improving the accommodation at termini and junctions. Speed was also called for, and

he advocated an all-round raising of averages. Retired railwaymen could help with sympathy and advice in solving these problems, which were intensely interesting not only to railway people but to the public.

Sir Herbert Walker, in proposing the toast of "Success to the Retired Railway Officers' Society" expressed his appreciation of the society's work in bringing its members together. It was truly indicative of that good feeling which always had and he hoped always would exist among railway officers.

Mr. E. J. H. Lemon, in seconding, referred to the question of accelerating passenger trains and mentioned how the demand for restaurant cars, three-a-side seating and similar factors were increasing the weight per passenger. Mr. T. H. Shipley replied for the society.

Mr. S. L. Murgatroyd, in proposing "The President," referred to Mr. Pettigrew's work as Locomotive Superintendent of the Furness Railway. This was the first occasion in its 33 years of existence on which the society had bestowed its favours on a mechanical engineer. Mr. J. Pike seconded.

Mr. Pettigrew, in a brief reply, referred to the acceleration of goods services and the consequent importance of fitting the continuous brake to all wagons. He said he would do all that he could to make the society a success.

"Transport Night" at the London Press Club

Speeches by Mr. Hore-Belisha, Sir Robert Horne, and Sir Eric Geddes

Mr. George Orton, Commercial Assistant to Superintendent of the Line, Great Western Railway, presided at a "Transport Night" dinner of the Press Club, London, on Friday, March 1. The guests of the evening were Mr. Hore-Belisha, Minister of Transport, Sir Robert Horne, Chairman, Great Western Railway Company, and Sir Eric Geddes, Chairman, Imperial Airways Limited. Other guests present included: Mr. R. Cope, Chief Accountant, Mr. F. R. E. Davis, Secretary, and Mr. C. R. Dashwood, Assistant General Manager, Great Western Railway.

Mr. George Orton, in proposing the toast of "Our Guests," said that generally house dinners at the Press Club were not regarded as serious occasions, but they must be guided to a certain extent by the class of guests they were entertaining. The present occasion was unique and he doubted whether such a gathering could have taken place anywhere else. They must make no hasty conclusions as to any future significance that might be attached to it. Their guests represented many millions of capital employed in the public service in the various means of transport which were coming closer together every day. They did not now speak of road *versus* rail transport. A new

word, co-ordination, had been substituted. In welcoming the guests he said that Mr. Hore-Belisha had made a most courageous bid for increased safety on the roads. He referred to the good fortune of the Great Western Railway Company in having secured Sir Robert Horne as its Chairman, and to Sir Eric Geddes, the Chairman of Imperial Airways, with which the British railways were delighted to be associated in connection with their rail-air services. He regretted the unavoidable absence of Lord Ashfield, representing London Transport, and Sir George McLaren Brown, European General Manager, Canadian Pacific Railway, as representing both sea and rail transport.

Mr. Hore-Belisha, in replying, referred to the fact that he was an old journalist and had been a member of the club. But if it was neither as a journalist nor as a politician that they desired to welcome him, he asked was it because of some sudden interest they were beginning to take in transport? If they required information on that question they might receive it from the other guests from their specialised standpoints.

Sir Robert Horne in the course of his reply referred to his war time asso-

ciations with Sir Eric Geddes and, continuing, said that the railways, which were now becoming interested in air services, had received much assistance from the Chairman of Imperial Airways. As a director of some shipping companies, he knew that the subject of air services was very prominently before the minds of the shipping people and there was every possibility of considerable development in the future of air communications in combination with the railways and the sea services. In connection with London transport, Lord Ashfield had rendered a service which he thought had not yet been fully appreciated. But for the combination of road transport with the Underground tube services, the transport situation in London would have been very different. The railways would have been unable to earn a sufficient revenue and their services, which were absolutely essential to the life of London, would in some measure or another have had to be supported by the State. That had been avoided by the combination of road and rail transport. It was probable that this idea of the unification of transport would be further developed in the future for the benefit of the whole community.

Sir Eric Geddes, in replying, said that civil aviation had a very friendly and sympathetic public and press. This he greatly valued, but he had never known so many experts and advisers, quite voluntary and unpaid, as one met with in aviation. Sometimes he felt that the public did not realise what progress was being made in civil aviation. There was no country in the world that had the same widespread routes or had ever proposed to carry the whole of the first class mail traffic by air to the major portion of the Empire. With the help of the Post Office and the Air Ministry they were going to do that at no greater cost than that at which door-to-door mail was carried in London—a penny halfpenny. The new airplanes now building for the large extension of the Empire mail would give much greater comfort and also sleeping accommodation for passengers. Speed and frequency were essential in operating successful air services. What virtue was there in spending money on a very fast flight if it was done only once a week? If they were to increase the speed on a hypothetical air route of seven or eight days, from 150 to 200 miles an hour flying speed it would cost half a million. The total civil air vote today was £600,000. That increase in speed would save only one day on the journey; it was not worth spending half a million to save one day.

HANCOCK & CO. (ENGINEERS) LTD.
NEW PREMISES.—The firm of Hancock & Co. (Engineers), Ltd., oxygen cutting machine manufacturers, has changed its address, the new office and works being in Progress Way (opposite the gas works in Purley Way) Croydon. The new telephone number is Croydon 4086.

Metropolitan Graduate and Student Society

The twelfth annual reunion dinner of the Institute of Transport Metropolitan Graduate and Student Society was held on Thursday, March 7, at the Windsor Castle Restaurant, London, S.W., under the chairmanship of Mr. J. M. Leighton Bailey.

Mr. Sidney E. Garcke, President of the Institute, proposing the toast of "The Metropolitan Graduate and Student Society," claimed that transport was now an important profession and those engaged in its prosecution were superior to the engineers who provided them with the material to use. This fact he stressed in order to emphasise the necessity of intensive study of the subject of transport, to which study the Metropolitan Graduate and Student Society made an important contribution. He would like to see the general audiences at the Institute of Transport meetings take a broader outlook on the various methods of transport. The reading of papers on subjects particularly concerned with one mode of transport should be followed by discussions in which those engaged in other forms should take a constructive part. In this way the outlook of the transport man would be broadened for the benefit of the profession as a

whole. Road transport was at present in a state of development, and it was important that pedestrians should be taught to take as much care in conducting themselves upon the public highways as any other form of transport. In this connection he paid a tribute to Mr. Hore-Belisha, the Minister of Transport, for his enterprise in establishing pedestrian crossings and so teaching pedestrians to follow clearly-marked traffic channels instead of wandering indiscriminately over the roads. Mr. Garcke concluded by remarking on the very healthy condition of the society, for his contribution to which Mr. C. F. King, the energetic Secretary, deserved congratulations.

Mr. Leighton Bailey, in responding, mentioned that the membership of the society had reached the record number of 289, and expressed the opinion that the society, in addition to its ordinarily accepted functions, formed an excellent recruiting medium for members of the Institute of Transport.

The toast of "The Visitors" was gracefully proposed by Mr. C. A. Dove, and responded to by Mr. T. E. Thomas, a Vice-President of the Institute of Transport, in a humorous speech.

QUESTIONS IN PARLIAMENT

Paris-Brindisi Rail and Air Service

Mr. Lyons, on March 6, asked the Under Secretary of State for Air if he could now intimate the date upon which the Paris-Brindisi rail journey would be eliminated from the regular Empire services of Imperial Airways Limited.

Sir Philip Sassoon.—The final elimination of the rail journey from Paris to Brindisi must wait on the augmentation of Imperial Airways' present fleet, which has had new and heavy demands made upon it in recent months by the decision to duplicate the services to Calcutta and the Cape, which has been considered as the most urgent objective. I am hopeful, however, that it may be possible to organise an interim service by air from London to Brindisi by lighter aircraft, primarily for the carriage of mails, within the next few weeks.

Railway Cloak-Rooms and Dismembered Bodies

Captain Cunningham-Reid, on March 7, asked the Secretary of State for the Home Department if the Commissioner of Police for the Metropolis was satisfied that the existing regulations governing the depositing of packages at railway cloak-rooms were adequate to prevent the growing use of these places for the concealment of dismembered bodies?

Sir John Gilmour.—The Commissioner of Police has no information

as to any growing use of railway cloak-rooms for the concealment of dismembered bodies. The legs recently discovered on railway premises were found under the seat of a railway carriage.

Barons Court Station

Mr. John Willmot asked the Minister of Transport whether he was aware that inconvenience was caused to the local residents and loss to local business people by reason of the non-stopping of trains at Barons Court station; and if he would make representations to the London Passenger Transport Board regarding the matter?

Mr. Hore-Belisha.—I have, as the hon. member will appreciate, no control in the matter, but I will, with pleasure, bring his question to the notice of the London Passenger Transport Board.

Crawley Level Crossing

Sir Henry Cautley asked the Minister of Transport whether his attention had been drawn to the congestion in Crawley, due principally to the level crossing of the Southern Railway on the London-Brighton road; and what action he proposed to take?

Mr. Hore-Belisha.—Yes, and I have agreed to make a substantial grant from the Road Fund towards the cost, £90,000, of a by-pass and a new bridge over the railway, which the West Sussex County Council proposes to construct.

NOTES AND NEWS

New London-Doncaster Air Service.—On Monday last a new internal air service was inaugurated between Doncaster and London (Croydon) by Crilly Airways Limited.

Weston Rhyn ex Preesgweene Station.—The Great Western Railway announces the change of name of Preesgweene station, between Shrewsbury and Chester, to Weston Rhyn.

High Speed Steam Locomotive for the P.L.M.—It is reported that the P.L.M. has ordered from the Bugatti firm a steam locomotive of 2,000 h.p., to be incorporated in a light streamlined train for high speed service.

Goods Train Collision at Kings Langley, L.M.S.R.—A goods train collision at Kings Langley, L.M.S.R., on Wednesday night, March 13, blocked all four lines and trains between Euston and the North were diverted to St. Pancras. On Thursday Birmingham-London trains were run from Paddington.

Belgian Railway Loan.—It is reported that the Belgian National Railways Company is negotiating for a short-term loan of Belgian fr. 500,000,000 (£5,000,000 at current rates) with an international banking syndicate, for the financing of purchases of 3,000 steel carriages.

Road Accidents.—The Ministry of Transport return for the week ended March 9 of persons killed or injured in road accidents is as follows:—

	Killed	Deaths resulting from previous accidents	Injured
England	56 (65)	25 (23)	2,890 (2,938)
Wales ...	5 (4)	1 (2)	124 (122)
Scotland	7 (7)	— (4)	327 (274)
	68 (76)	26 (29)	3,341 (3,334)

The total fatalities for the week were, therefore, 94, as compared with 105 for the previous week.

G.W.R. Ambulance Presentation at Fishguard.—Mr. J. F. Lean, Principal Assistant to the General Manager, G.W.R., attended with Mrs. Lean at the Ambulance Hall, Goodwick, on Saturday, March 2, to distribute awards gained by members of the Fishguard and Goodwick ambulance class. The gathering was presided over by Captain R. Sharp, who was supported by Mr. F. Yeomans (station master) and Mrs. Yeomans, Councillor B. Miles Thomas, Chairman of Fishguard and Goodwick Urban Council, Councillor D. T. Evans, President of the class, and other local officials. Mr. G. H. Taylor, secretary, submitting his report on the progress of the class, paid tribute to the excellent work of their lecturer, Dr. L. H. Terry. In distributing the awards, Mr. Lean congratulated the members of the Fishguard team on getting into the semi-final round of the competitions, and hoped to see them at Paddington in May at the Final. He was particularly

gratified at the large number of beginners' teams entering the contest. Councillor B. Miles Thomas then presented the challenge shield and prizes to three winning teams.

French Railway Accident.—An express from Libourne, bound for Bordeaux, was derailed on March 7 near St. Loubes. The cause of the crash is reported to have been a defective wheel or axle. Five persons were killed and ten seriously injured.

Legality of Argentine Railway Co-ordination.—An Exchange Telegraph message from Buenos Aires, states that the Argentine Attorney-General has ruled that there is no legal objection to the B.A.G.S. and B.A. Western Railways co-ordinating their services and managements.

New Russia-Poland Rail Connection.—Following the establishment in January of a new direct railway connection between Lwow, Kiev and Odessa, it is proposed to establish shortly a similar direct connection between Moscow and Vienna, via Warsaw, and a conference to settle details is to be held at Warsaw. This will be attended by representatives of the railways of Poland, the U.S.S.R., Austria, and Czechoslovakia.

L.M.S.R. Photographic Society Exhibition.—The tenth annual exhibition of the work of the members of the L.M.S.R. Photographic Society is being held this week in the Shareholders' room at Euston station. With Mr. W. K. Wallace, Chief Civil Engineer, in the chair, Mrs. Fielden, wife of Mr. E. B. Fielden, Deputy Chairman of the L.M.S.R., opened the exhibition and presented the awards on Monday evening last. Among others present were Messrs. E. B. Fielden, G. H. Loftus-Allen, G. L. Darbyshire, and W. A. Stanier. Some 150 photographs are exhibited, all of which attain a very high standard.

Great Southern Railways (Ireland) Strike.—The ten-day strike which began on March 2, came to an end on the 12th. It is said to have been due to the suspension of a member of the Federation of Irish Rail and Road Workers' Union in deference to a complaint lodged by the Irish Engineering and Foundry Union. Starting among the shed staff at Inchicore, it spread to Kingsbridge station and all main line trains thence ceased to run. The men are reported to have attended their places of work, but to have refused to carry out their duties there. All Cork main line traffic became sectionally affected, and road transport was substituted over the sections concerned. From March 5 matters began to improve, and, in spite of a setback due to signalmen coming out, this improvement continued until the final termination of the strike on Tuesday. The concurrent road transport strike—arising from the

dismissal of a bus driver legally found to have driven dangerously—is affecting all Dublin, and is still continuing.

High-speed Steam Locomotive Delivered to the Reichsbahn.—The Borsig works has just delivered to the German State Railway the first of the two 4-6-4 streamlined high-speed locomotives, of which a diagram and brief particulars appeared in our issue of March 1. The engine is now undergoing trials.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of January, 1935, amounted to \$8,267,000, a decrease of \$703,000 in comparison with January, 1934. Working expenses were \$8,063,000, a decrease of \$18,000, leaving net earnings of \$204,000, which were lower by \$685,000.

Canadian National Earnings.—The statement of earnings and expenses of the Canadian National Railways for the month of January, 1935, shows gross earnings of \$12,110,286, an increase of \$547,709, and operating expenses of \$12,853,940, which were \$482,397 higher, leaving a deficit of \$743,654, which is \$65,312 lower than that for January, 1934.

The King's Jubilee Celebrations.—The four British main-line railways have had under consideration the question of leave and payment of salaries and wages to railway staff on the occasion of His Majesty's Jubilee Celebrations on Monday, May 6, and have now decided that as many as practicable of the regular staff will be given a day's leave, with pay, on May 6, the payment being at ordinary time or day rates. In view of public requirements, it will not be practicable to release all staff from duty on that day, and those who cannot be liberated on May 6 will be paid for work performed on that day as for an ordinary weekday, but will be given an additional day's leave with pay on another day, or, if this cannot be arranged, an additional day's pay at ordinary rates. The railway staff covered by these arrangements numbers some 550,000.

Permanent Way Institution Dinner at Sheffield.—The fourteenth annual dinner of the Sheffield Section of the Permanent Way Institution was held on March 12, under the chairmanship of Captain J. Clifford Cowen. Mr. J. C. L. Train, Assistant Engineer, Maintenance, Southern Area, L.N.E.R., in proposing the toast of "The City and Trade of Sheffield" referred to the steel link between Sheffield and the Permanent Way Institution, neither of which would exist, let alone have come to its present flourishing condition, but for the development of steel. He mentioned that the L.N.E.R. had spent £540,000 on iron and steel products in Sheffield alone last year, and another £470,000 within a radius of 8 miles of Sheffield. The Lord Mayor of Sheffield, Alderman P. J. M. Turner, in responding, suggested that the adjective per-

manent might before long have to be modified in view of the development of air transport. Such developments might not result in the abolition of the permanent way in our lifetime, but what might be regarded as permanent today might appear very far from permanent to the next generation. Mr. W. B. Pickering, President of the Sheffield Chamber of Commerce, also replied. Mr. J. B. Woodman, who proposed the toast of "The Permanent Way Institution," considered that permanent way would have to remain as long as it was necessary to carry heavy loads. For himself he could not visualise the day when alternators and turbines produced in some great works would be fitted with wings to transport them to the site of their operation. Mr. W. K. Wallace, Chief Civil Engineer, L.M.S.R. and President of the Institution, said that whatever opinions might be expressed about other methods of transport nothing had so far beaten the steel tyre and the steel rail for all-round

utility and efficiency. Mr. Donald D. Shaw proposed the toast of "The Chairman," to which Captain J. Clifford Cowen responded, and Councillor Henry Kirk proposed the toast of "The Visitors," to which responses were made by Mrs. G. H. Cowen and Mr. W. A. Willox. Among others present were Mr. John Miller, Mr. F. E. Harrison, Mr. B. P. Fletcher, Mr. S. L. Murgatroyd, Mr. L. V. Warhurst and Mr. F. A. Knutt.

Southend Section Improvements, L.M.S.R.—The new 2-6-4 three-cylinder tank engines designed by Mr. W. A. Stanier, Chief Mechanical Engineer, L.M.S.R., are now working into Fenchurch Street. These locomotives were illustrated and described in THE RAILWAY GAZETTE of March 30, 1934, and have been designed specially for such services as those between London and Southend, their high accelerative capacity being an important advantage for the frequent and fast business trains between these places.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 10th Week			Totals to Date		
	1935	1934	Inc. or Dec.	1935	1934	Inc. or Dec.
L.M.S.R. (6,926½ mls.)	£	£	£	£	£	£
Passenger-train traffic...	370,000	365,000	+ 5,000	3,652,000	3,601,000	+ 51,000
Merchandise, &c. ...	469,000	468,000	+ 1,000	4,369,000	4,429,000	- 60,000
Coal and coke ...	265,000	274,000	- 9,000	2,683,000	2,737,000	- 54,000
Goods-train traffic ...	734,000	742,000	- 8,000	7,052,000	7,166,000	- 114,000
Total receipts ...	1,104,000	1,107,000	- 3,000	10,704,000	10,767,000	- 63,000
L.N.E.R. (6,339 mls.)						
Passenger-train traffic...	246,000	243,000	+ 3,000	2,449,000	2,397,000	+ 52,000
Merchandise, &c. ...	306,000	322,000	- 16,000	3,043,000	3,143,000	- 100,000
Coal and coke ...	247,000	262,000	- 15,000	2,434,000	2,527,000	- 93,000
Goods-train traffic ...	553,000	584,000	- 31,000	5,477,000	5,670,000	- 193,000
Total receipts ...	799,000	827,000	- 28,000	7,926,000	8,067,000	- 141,000
G.W.R. (3,749½ mls.)						
Passenger-train traffic...	157,000	160,000	- 3,000	1,553,000	1,528,000	+ 25,000
Merchandise, &c. ...	182,000	185,000	- 3,000	1,763,000	1,748,000	+ 15,000
Coal and coke ...	103,000	114,000	- 11,000	1,058,000	1,124,000	- 66,000
Goods-train traffic ...	285,000	299,000	- 14,000	2,821,000	2,872,000	- 51,000
Total receipts ...	442,000	459,000	- 17,000	4,374,000	4,400,000	- 26,000
S.R. (2,172 mls.)						
Passenger-train traffic...	233,000	227,000	+ 6,000	2,325,000	2,268,000	+ 57,000
Merchandise, &c. ...	58,500	66,000	- 7,500	568,500	621,500	- 53,000
Coal and coke ...	31,500	37,000	- 5,500	352,500	383,500	- 31,000
Goods-train traffic ...	90,000	103,000	- 13,000	921,000	1,005,000	- 84,000
Total receipts ...	323,000	330,000	- 7,000	3,246,000	3,273,000	- 27,000
Liverpool Overhead ...	1,088	1,037	+ 51	10,942	10,841	+ 101
(6½ mls.)						
Mersey (4½ mls.) ...	3,817	3,903	- 86	41,175	42,036	- 861
*London Passenger Transport Board ...	522,800	520,800	+ 2,000	19,101,000	18,729,300	+ 371,700
IRELAND						
Belfast & C.D. (80 mls.) pass.	1,594	1,659	- 65	17,143	17,430	- 287
" " goods	493	512	- 19	4,651	5,250	- 599
" " total	2,087	2,171	- 84	21,794	22,680	- 886
Great Northern (543 mls.) pass.	8,700	7,100	+ 1,600	78,800	70,950	+ 7,850
" " goods	8,000	8,550	- 550	80,800	82,350	- 1,550
" " total	16,700	15,650	+ 1,050	159,600	153,300	+ 6,300
Great Southern (2,124 mls.) pass.	15,986	19,319	- 3,333	183,172	185,227	- 2,055
" " goods	19,822	32,538	- 12,716	353,537	320,260	+ 33,277
" " total	35,808	51,857	- 16,049	536,709	505,487	+ 31,222

* 36th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes

British and Irish Railways Stocks and Shares

Stocks	Highest 1934	Lowest 1934	Prices	
			Mar. 13, 1935	Rise/Fall
G.W.R.				
Cons. Ord. ...	661½	481½	471½	—
5% Con. Prefce. ...	118	109	113½	-1½
5% Red. Pref. (1950) ...	115	107	110½	-1
4% Deb. ...	117	105	111	-1
4½% Deb. ...	119	109	114½	-1
4½% Deb. ...	129½	115½	123½	-1
5% Deb. ...	135	126¼	136½	-2
2½% Deb. ...	75	64	80	-1½
5% Rt. Charge ...	1347½	123¼	130½	-1
5% Cons. Guar. ...	132¾	121¾	127½	—
L.M.S.R.				
Ord. ...	301½	191½	171½	+1½
4% Prefce. (1923) ...	64½	41	46	+2
4% Prefce. ...	87	69½	77½	+2
5% Red. Pref. (1955) ...	107	92½	100½	-1
4% Deb. ...	114½	100½	104	—
5% Red. Deb. (1952) ...	118½	111½	117½	—
4% Guar. ...	106½	96¾	98½	+1½
L.N.E.R.				
5% Pref. Ord. ...	24¾	13½	10¾	+1½
Def. Ord. ...	111½	67½	5¾	—
4% First Prefce. ...	76	59½	62¾	-2½
4% Second Prefce. ...	47	25½	23	+½
5% Red. Pref. (1955) ...	94½	80	81½*	-4
4% First Guar. ...	104	92	94½	-1
4% Second Guar. ...	97½	86½	86	-1½
3% Deb. ...	90	74½	78	-½
4% Deb. ...	114	99½	102	—
5% Red. Deb. (1947) ...	117	108	113½	-2
4½% Sinking Fund Red. Deb.	111½	105½	110½	—
SOUTHERN				
Pref. Ord. ...	90	63½	80	+2
Def. Ord. ...	32½	19	21½	+1½
5% Prefce. ...	118½	107½	113½	-1½
5% Red. Pref. (1964) ...	115½	107½	114½	—
5% Guar. Prefce. ...	132	120½	127½	-1
5% Red. Guar. Pref. (1957) ...	119½	113	117½	—
4% Deb. ...	116½	103½	110½	-1½
5% Deb. ...	134	124½	134½	—
4% Red. Deb. 1962-67	113½	105½	111½	—
BELFAST & C.D.				
Ord. ...	6	5	5	-1½
FORTH BRIDGE				
4% Deb. ...	110	100	109½	—
4% Guar. ...	110	100	109½	—
G. NORTHERN (IRELAND)				
Ord. ...	9¾	41½	9	-1
G. SOUTHERN (IRELAND)				
Ord. ...	25	12½	25	—
Prefce. ...	21½	13½	26	—
Guar. ...	48	39	56	-1
Deb. ...	67	59	75½	+1½
L.P.T.B.				
4½% "A" ...	126	115	121½	—
5% "A" ...	135½	124½	131½	-½
4½% "T.F.A." ...	113½	107½	112	—
5% "B" ...	131½	118	123½	-1
5% "C" ...	97	73	98	+1
MERSEY				
Ord. ...	151½	7	14	—
4% Perp. Deb. ...	93½	82½	94½	—
3% Perp. Deb. ...	66½	61½	69½	—
3% Perp. Prefce. ...	54	44½	52½	—

* ex dividend

CONTRACTS AND TENDERS

The Société Franco-Belge de Materiel de Chemins de Fer has received an order from the Algerian Railways for twelve 4-6-2 + 2-6-4 Beyer-Garratt articulated locomotives specially designed for high-speed passenger service. The new locomotives, references to which are made in an editorial note and also on page 500 of this issue, will be designed in close collaboration with Beyer, Peacock & Co. Ltd., of Manchester.

Nasmyth Wilson & Co. Ltd. has received an order from the South Indian Railway for seven superheated boilers for B class metre gauge 4-6-0 locomotives to the inspection of the consulting engineers, Messrs. Robt. White & Partners.

Wagons for the L.P.T.B.

The London Passenger Transport Board has placed the following orders for rolling stock for ballast trains:—

Hurst Nelson & Co. Ltd.: Six 20-ton brake vans.

Gloucester Railway Carriage & Wagon Co. Ltd.: Eleven 30-ton flat wagons; seven 22-ton hopper wagons; six 20-ton rail wagons; and four 10-ton runner wagons.

Coaches for Gold Coast

The Metropolitan-Cammell Carriage & Wagon Co. Ltd. has received orders from the Crown Agents for the Colonies for seven all-steel bogie third-class coaches, and six all-steel bogie brake-third composite coaches required for the 3 ft. 6 in. gauge lines of the Gold Coast Government Railway. This stock is to be mounted on Sheffield-Twinberrow bogies.

Locomotives for India

The Hunslet Engine Co. Ltd. has received an order from the Assam Bengal Railway for six YK class 2-6-0 superheated metre gauge locomotives with six-wheeled tenders. Three of the engines will have R.C. poppet valve gear and the remaining three Caprotti poppet valve gear. The cylinder dimensions are 14 in. x 22 in.

Tubes Limited has received an order for 400 solid drawn steel boiler tubes and 60 solid drawn steel superheater smoke tubes for the Antofagasta (Chili) & Bolivia Railway.

Isca Foundry Limited has received an order from the Bhavnagar State Railway for 130 metre-gauge points and crossings to the inspection of Messrs. Robt. White & Partners.

Electro-Mechanics Limited has received orders from the Indian Stores Department for 1,800 9 ft. 9½ in. x 1½ in. boiler tubes at a total price of Rs. 5,803 and 2,500 12 ft. x 1½ in. boiler tubes at a total price of Rs. 12,917, free delivery.

G. H. Sheffield & Co. (Engineers) Ltd. has received, through the firm's Calcutta office, a further repeat order for eight Sheffield-Twinberrow passenger bogies complete with wheels and axles and Framwel axleboxes for the Udaipur-Chitogarh Railway.

Thermotank Limited has received an order from the L.M.S.R. for 28 sets of air-conditioning plant for installation in sleeping cars.

Coaches for L.N.E.R.

The L.N.E.R. has placed orders for a total of 210 main line coaches:—

Metropolitan-Cammell Carriage & Wagon Co. Ltd.: 60 Corridor third-class coaches with end doors only; and 30 corridor composite coaches each with three first, one first-coupe and four third-class compartments.

Birmingham Railway Carriage & Wagon Co. Ltd.: 100 Corridor third-class coaches with compartment side doors; and 20 corridor composite coaches each with three first, one first coupe and four third compartments.

These coaches are required to be delivered in time for the summer traffic.

Water Softening Plant for L.N.E.R.

William Boby & Co. Ltd. has received orders from the L.N.E.R. for a locomotive water softening plant of 720,000 galls.-daily capacity for installation at Stratford running sheds and another of 30,000 galls.-daily capacity for installation at Hornsey running sheds.

Locomotives for Egypt

The North British Locomotive Co. Ltd. has secured an order for 50 2-6-0 locomotives from the Egyptian State Railways. The original enquiry, announced in this column in our issue for November 2, 1934, was for 20 locomotives only, and the engines, which were described as for service in the lighter track sections, were to have an axle loading of 17 tons, boiler pressure 225 lb. per sq. in., tractive effort at 85 per cent., boiler pressure exceeding 25,000 lb., with an adhesion factor of 4.52. Twenty of the engines are to be fitted with Caprotti valve gear, and the remainder with Walschaerts gear. Ten engines will have grease lubrication. The total value of the contract is £E.270,000. An outline diagram of the new class appeared on p. 702 of the issue mentioned.

Reichwald (London) Limited, through Vereinigte Deutsche Metallwerke, has received an order from the Egyptian State Railways Administration for solid-drawn copper tubes at total price of £409 6s. 4d. f.o.b. Rotterdam/Antwerp.

Imperial Chemical Industries (India) Limited and G. D. Peters (India) Limited have each received orders from the Indian Stores Department for quantities of electrodes.

Howell & Co. Ltd. has received an order from the Central Argentine Railway for 460 solid drawn steel superheater smoke tubes and 4,000 solid-drawn steel boiler tube safe ends.

Braithwaite & Co. (India) Ltd. has received an order from the Indian Stores Department for two electrically-operated overhead travelling cranes of 65 ft. span and 60 tons capacity complete with travel motor control gear, at a total price of Rs. 41,747.

Motor Rail Limited has received an order from the South Indian Railway for the conversion of a Simplex petrol-driven railcar to diesel-mechanical drive. The engine to be fitted is a Gardner 40-b.h.p. diesel and the work is to the inspection of the consulting engineers, Messrs. Robt. White & Partners.

Leyland Motors Limited has received an order from the Southdown Motor Services Limited for two Tiger six-wheeled passenger vehicles.

Goods Wagons for South America

The Birmingham Railway Carriage & Wagon Co. Ltd. has received an order from the Peruvian Corporation for 20 35-ton bogie covered goods wagons.

The Swedish State Railways Administration has bought 119,500 tons of British coal, the brands being Maude, Bentinck, Broomhill, Lambton, South Helton, and Wemyss. The quantity includes 4,000 tons of bunker coal, which has generally been German, but this time is Horden Special. The prices range from 16s. 10d. to 19s. 8d.

The Crown Agents for the Colonies have recently placed orders for materials and equipment as follow:—

Power-Samas Accounting Machines Limited: Accounting machines.

Eyre Smelting Co. Ltd.: Copper ingots.

Ferguson Pailin Limited: E.H.T. and L.T. equipment.

W. H. Allen Sons & Co. Ltd. and Ruston & Hornsby Limited: Generating sets.

Hewitt Electric Co. Ltd.: Mercury arc rectifier.

Thomas & Sons (Worcester) Ltd.: Pumping equipment.

J. McIlwraith & Co. Ltd.: Rooflex roofing canvas.

G. Swift & Sons Ltd.: Shaping machine and accessories.

Brush Electrical Engineering Co. Ltd.: Static transformers.

P. & W. McLellan Limited: Steel.

Cowans Sheldon & Co. Ltd.: Travelling crane.

H. W. Ward & Co. Ltd.: Turret lathe and accessories.

F. Morton & Co. Ltd.: Steelwork.

The B.B. & C.I. Railway Administration invites tenders, receivable at The White Mansion, 91, Petty France, Westminster, S.W.1, by April 3, for the supply of carriage wheels and axles.

The Agent, North Western Railway of India, Lahore, invites tenders, receivable by April 2, for locomotive copper back and wrapper plates, and receivable by April 17, for axle-box bodies, horn blocks, drag boxes, and piston heads, all in cast steel.

The Royal State Railways of Siam Administration is calling for tenders, to be presented in Bangkok by May 10, for the supply of 2,000 draw bars for wagons. Further details can be obtained from the Department of Overseas Trade. Reference number G.Y. 14907 should be quoted.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department, Engineering Section, receivable by April 1, for boiler and flue tubes required for the G.I.P., N.W., and E.B. Railways during the period August 15, 1935, to August 14, 1936; and also receivable by April 1, for india-rubber fittings for railway carriages for the E.I., E.B., N.W., and G.I.P. Railways on a running contract basis during the period August 16, 1935, to August 15, 1936.

OFFICIAL NOTICES

ASSISTANT ENGINEER required by the Government of Iraq for the Railway Department, for one year. Salary commencing at Iraqi Dinars 63/750 a month in the scale I.D.60/000-3/750-I.D.97/500 a month. (I.D.1=£1). Free passages and liberal leave on full salary. Candidates, under 33, preferably unmarried, must be A.M.I.C.E. or possess an engineering degree obtained at a recognised University. Must have had at least three years' experience on track maintenance on open line and also recent experience in the design and construction of reinforced concrete works. Knowledge of Arabic an advantage.—Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to THE CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/3638.

THE MADRAS & SOUTHERN MAHRATTA RAILWAY CO. LTD. invite Tenders for:—

COPPER RODS, TUBES AND SHEETS.

Specification and Form of Tender can be obtained at the Company's Offices, 25, Buckingham Palace Road, Westminster, London, S.W.1. Fee ONE GUINEA, which will not be returned.

Tenders must be submitted not later than 2 o'clock p.m. on Tuesday, 26th March, 1935.

The Directors do not bind themselves to accept the lowest or any Tender and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
G. W. V. DE RHE PHILIPPE,
Secretary.

OFFICIAL ADVERTISEMENTS

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to: *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

Pickfords' 300 Years of Transport

Mr. C. R. Dashwood, Assistant General Manager, G.W.R., presided over a crowded attendance of members at the G.W.R. Debating Society at Paddington on March 7, when Mr. Shirley H. James, of Pickfords Limited, gave an illustrated lecture on "Three Hundred Years of Transport: The Story of Pickfords." The speaker unfolded the romantic story of this famous transport firm from its origin in the seventeenth century, when teams of packhorses were its means of merchandise conveyance, to the present day when, although railway-owned, Pickfords is a transport agency of nation-wide and even world-wide fame.

The packhorse era was followed by a period when wide-wheeled covered wagons were hauled by teams of six or eight horses slowly and with difficulty over such primitive and deeply-rutted roads as then existed. There are records of Pickfords' wagons in use as early as 1675. With the gradual evolution of better roads in the eighteenth century, came the lighter fly wagon, swifter and better sprung than its predecessor, in which goods and passengers were conveyed. Martha Pickford, head of the firm in the 1760's and 1770's, was deeply engaged in the carriers' business in London, the Midlands, and the North, and the firm also took a leading part in the development of transport by canal.

Growth of canal traffic encouraged Pickfords to construct its own wharves and warehouses in London, the best known of which were those at Paddington, Deptford, Brentford, and the City Basin. Fly wagons and canal barges slowly disappeared following the advent of railways in the nineteenth century and Pickfords' directors had the wisdom to ally themselves to the new form of transport. The alliance was mutually helpful and Pickfords' accounting system, with goods classifications, returns, &c., was useful as a basis for the comparable records and accounts which became necessary to the railways.

From the beginning of railways to the present time Pickfords' history is largely railway history. Up to 1900, the firm acted as general cartage

agent for the London & North Western Railway; it also acted in a similar capacity for the London Brighton & South Coast Railway and still so acts over parts of that portion of the Southern Railway.

With the development of the internal


combustion engine Pickfords' took its chance of reverting to the first business of road carrying, and long-distance runs haunted by the ghosts of Pickfords' fly wagons of nearly 300 years ago are undertaken by the firm's motor vehicles of today. Up to the era of air transport, Pickfords' exemplifies in a single firm the transport history of the nation.

Saving for Travel

GREAT WESTERN RAILWAY


Ordinary Postage Stamps each of 6d. in value affixed to this card will be accepted in payment for Tickets issued by the Company.
The Stamps must not be cancelled, defaced or damaged in any way.

TAKE GREAT CARE OF THIS CARD

AFFIX SIXPENNY POSTAGE STAMPS ONLY

The G.W.R. is instituting a simple and convenient savings scheme for the purchase of rail tickets. Travel saving cards will be issued to the public upon application, from a large number of stations throughout the company's system. On each card space has been provided for 20 ordinary sixpenny postage stamps. The booking clerk records the name of the person at the time the card is issued, and the station's name is stamped on the back of the

<p>TRAVEL SAVINGS ♦♦ CARD ♦♦</p> <p>SAVE AT LEISURE FOR FUTURE PLEASURE</p> <p>The Great Western Railway have organised a Holiday Savings Scheme whereby small amounts regularly set aside from week to week may be accumulated ready for your holidays.</p> <p>A SIMPLE AND CONVENIENT SCHEME.</p> <p>All you have to do is to purchase at any Post Office ordinary postage stamps value 6d. each and affix to this card. The card must be fully stamped.</p> <p>NOTE.—The stamps must not be cancelled, defaced or damaged in any way.</p> <p>When you wish to purchase Railway Ticket, or Tickets, present this card at the G.W.R. Booking Office at _____ when it will be accepted in lieu of cash to the total value of the stamps affixed, for Railway Tickets of any description issued by this Company.</p> <p>"HOLIDAY HAUNTS"—the G.W.R. Official Guide—will assist in solving your holiday problem. Obtainable at G.W.R. Stations and Offices or from Booksellers. PRICE 6d.</p> <p>TAKE GREAT CARE OF THIS CARD.</p> <p>Paddington Station, London, W.2</p> <p></p> <p>James Milne, General Manager</p>
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card itself. When fully stamped, each card represents a face value of ten shillings and will be accepted at the issuing booking office, either in full or part payment of whatever ticket the passenger requires. Any shortage in the fare will be adjusted by cash payment at the same time. The scheme, which covers every type and class of ticket in operation, has already been tried out at a few places in South Wales, where it has met with striking success.

Railway Share Market

The stock and share markets commenced the new Fortnightly Account with greater confidence. One of the most interesting markets proved to be for Home railway stocks. It is a curious reflection of the anomalous attitude occasionally shown by the investing public to investments that although net receipts of the four big railways show an aggregate increase of £2½ for the past year over 1933, the prices of the ordinary stocks of the companies are substantially lower than at this time last year. As an example, Southern deferred ordinary stock which, it is now generally agreed, has been brought considerably nearer to the stage where resumption of dividends is possible, stood at this time twelve months ago at 31½, or about ten points higher

than the present figure. The preferred ordinary stock is at about the same level as a year ago. It is anticipated that there will be a recovery in the deferred stock which, on the basis of a resumption of 2½ per cent. dividend next year, would show a yield of over 12 per cent. at the present price. The L.M.S. issues have also been in demand with special favour shown for the first 4 per cent. and 1923 preference stocks. The market is estimating for the payment of 2½ per cent. on the 1923 preference stock for 1935, although it is necessarily too early to form any definite view on the point.

London & North Eastern issues preference and guaranteed stocks have moved up in price and Great Western ordinary stock kept firm. London Transport "C"

stock was again being accumulated by investors who anticipate an increased dividend encouraged by the views expressed at the meeting of Thomas Tilling Limited.

Outside the home railway market there was little of exceptional interest apart from the big slump of eight points in Canadian Pacific preference stock on the decision of the directors to omit the payment of a dividend on the stock for the second year in succession. The improvement in profits had been anticipated but the recent downward trend of traffic receipts had warned the Stock Exchange that there was some doubt as to the payment. The heavy fall was due more largely, it is thought, to the indications believed to underlie certain items in the accounts that shareholders may have to wait some time yet for dividend resumption.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1934-35	Week Ending	Traffics for Week		No. of Weeks	Aggregate Traffics to Date			Shares or Stock	Prices						
			Total this year	Inc. or Dec. compared with 1934		Totals		Increase or Decrease		Highest 1934	Lowest 1934	Mar. 13, 1935	Yield % (See Note)			
						This Year	Last Year									
South & Central America.	Antofagasta (Chili) & Bolivia	830	10.3.35	£ 9,510	—	£ 5,500	10	122,330	126,910	—	£ 4,580	Ord. Stk.	265 ⁴ / ₈	19	17 ¹ / ₂	Nil
	Argentine North Eastern	753	9.3.35	6,903	+	93	36	260,325	302,807	—	42,482	A. Deb.	11	6 ⁷ / ₈	7	Nil
	Argentine Transandine	111	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Bolivar	174	Feb., 1935	6,600	+	200	8	12,450	12,950	—	500	6 p.c. Deb.	10	10 ¹ / ₂	10	Nil
	Buenos Ayres & Pacific	2,806	9.3.35	95,272	—	1,744	36	2,635,679	3,014,636	—	378,957	Bonds.	135 ⁴ / ₈	161 ¹ / ₂	7 ¹ / ₂	315 ¹ / ₁₆
	Buenos Ayres Central	190	24.2.35	\$102,000	+	\$9,300	34	\$3,832,300	\$3,814,000	+	\$18,300	Mt. Deb.	23	10	21 ¹ / ₂	Nil
	Buenos Ayres Gt. Southern	5,085	9.3.35	188,889	+	13,904	36	5,087,356	5,815,101	—	727,745	Ord. Stk.	35	22	23 ¹ / ₂	Nil
	Buenos Ayres Western	1,930	9.3.35	48,463	—	1,624	36	1,570,189	1,879,226	—	309,037	"	27 ¹ / ₂	18 ¹ / ₂	20	Nil
	Central Argentine	3,700	9.3.35	109,628	—	7,209	36	4,238,975	4,834,306	—	595,331	"	23 ¹ / ₂	13 ¹ / ₂	15	Nil
	Do.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Cent. Uruguay of M. Video	273	9.3.35	18,747	+	1,060	36	610,350	591,891	+	18,459	Ord. Stk.	15 ¹ / ₂	8	8	Nil
	Do. Eastern Extn.	311	9.3.35	4,382	+	817	36	130,510	117,182	+	13,328	"	—	—	—	—
	Do. Northern Extn.	185	9.3.35	2,296	+	90	36	70,794	63,913	+	6,881	"	—	—	—	—
	Do. Western Extn.	211	9.3.35	1,341	—	457	36	55,450	59,317	—	3,867	"	—	—	—	—
	Cordoba Central	1,218	9.3.35	22,340	—	3,020	36	1,033,730	1,253,330	—	219,600	Ord. Inc.	6	3	3	Nil
	Costa Rica	188	Dec., 1934	18,046	+	2,804	26	99,051	114,966	—	15,915	Stk.	305 ³ / ₈	23 ¹ / ₂	31 ¹ / ₂	65 ⁵ / ₈
	Dorada	70	Jan., 1935	10,500	—	1,200	4	10,500	11,700	—	1,200	1 Mt. Db.	103	95	102 ¹ / ₂	57 ⁵ / ₈
	Entre Rios	810	9.3.35	9,545	+	1,662	36	451,609	464,749	—	13,140	Ord. Stk.	21 ¹ / ₂	12	14	Nil
	Great Western of Brazil	1,082	9.3.35	9,600	—	700	10	110,000	106,300	+	3,700	Ord. Sh.	7 ⁵ / ₈	3 ³ / ₈	4 ¹ / ₂	Nil
	International of Cl. Amer.	794	Jan., 1935	\$429,477	—	\$31,256	4	\$429,477	\$460,733	—	\$31,256	"	—	—	—	—
Interoceanic of Mexico	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
La Guaira & Caracas	225 ¹ / ₂	Feb., 1935	3,400	+	220	8	6,500	7,580	—	1,080	Stk.	125 ⁴ / ₈	75 ⁵ / ₈	8 ¹ / ₂	Nil	
Leopoldina	1,918	9.3.35	22,308	—	2,417	10	225,584	223,469	—	2,115	Ord. Stk.	145 ⁷ / ₈	7	7	Nil	
Mexican	483	7.3.35	\$228,500	—	\$1,900	9	\$2,202,700	\$1,997,900	+	\$204,800	"	31 ¹ / ₂	11 ¹ / ₂	11 ¹ / ₂	Nil	
Midland of Uruguay	319	Feb., 1935	10,768	—	1,455	34	89,883	77,993	+	11,890	"	11 ¹ / ₂	12	11 ¹ / ₂	Nil	
Nitrate	401	28.2.35	7,172	—	3,697	8	26,345	52,992	—	26,647	Ord. Sh.	329 ³ / ₈	51 ⁷ / ₈	28 ¹ / ₂	Nil	
Paraguay Central	274	9.3.35	5,680	—	2,760	36	175,060	114,920	+	60,140	Pr. Li. Stk.	84	67	70	89 ¹ / ₈	
Peruvian Corporation	1,059	Feb., 1935	62,821	—	11,259	34	499,646	439,952	—	59,694	Pref.	14 ¹ / ₂	8	8	Nil	
Salvador	100	2.3.25	234,700	—	4,500	35	657,102	658,583	—	£1,481	Pr. Li. Db.	75	70	70	71 ¹ / ₂	
San Paulo	153 ¹ / ₂	3.3.35	35,083	—	364	9	287,650	272,680	—	14,970	Ord. Stk.	86	67	66	61 ¹ / ₂	
Taitai	164	Feb., 1935	4,161	—	1,341	34	20,831	18,412	—	2,419	Ord. Sh.	21 ¹ / ₂	17 ¹ / ₂	15 ¹ / ₂	61 ¹ / ₂	
United of Havana	1,365	2.3.35	55,080	—	21,488	35	722,065	521,092	+	200,973	Ord. Stk.	6	2	3	Nil	
Uruguay Northern	73	Feb., 1935	1,012	—	74	34	9,458	9,391	+	67	Deb. Stk.	61 ⁴ / ₈	3	4 ¹ / ₂	Nil	
Canada.	Canadian National	23,735	7.3.35	622,589	+	7,094	9	5,529,412	5,233,053	+	296,359	"	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Grand Trunk	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Canadian Pacific	17,211	7.3.35	448,400	—	6,800	9	3,833,000	3,963,200	—	130,200	4 p.c. Gar.	78 ¹ / ₂	51 ¹ / ₂	69 ¹ / ₂	53 ¹ / ₂
India.	Assam Bengal	1,329	9.2.35	28,500	—	2,044	45	1,225,579	1,072,096	+	153,482	Ord. Stk.	88 ¹ / ₂	72	83 ¹ / ₂	35 ⁵ / ₈
	Barsi Light	202	16.2.35	3,180*	—	908	46	123,120	132,060	—	8,940	Ord. Sh.	104 ¹ / ₂	98 ³ / ₄	103 ¹ / ₂	51 ¹ / ₂
	Bengal & North Western	2,113	23.2.35	57,797	+	4,128	21	1,069,234	966,046	+	103,188	Ord. Stk.	297 ¹ / ₂	262	293 ¹ / ₂	59 ¹ / ₂
	Bengal Dooars & Extension	161	16.2.35	3,193	—	619	46	138,453	136,519	—	1,934	"	125 ¹ / ₂	124	124 ¹ / ₂	55 ¹ / ₂
	Bengal Nagpur	3,269	9.2.35	131,550	—	1,500	45	5,069,964	4,698,080	+	368,884	"	105 ¹ / ₂	96	104 ¹ / ₂	31 ¹ / ₂
	Bombay, Baroda & Cl. India	3,072	2.3.35	185,475	—	7,950	48	7,598,100	7,298,625	—	299,475	"	115	108 ¹ / ₂	114 ¹ / ₂	54 ¹ / ₂
	Madras & South'n Mahratta	3,230	9.2.35	110,775	—	11,949	45	4,772,356	4,848,551	—	76,195	"	131	122 ³ / ₄	127 ¹ / ₂	71 ¹ / ₂
	Rohilkund & Kumaon	572	23.2.35	13,811	—	542	21	212,627	203,532	+	9,095	"	263	250	283 ¹ / ₂	55 ⁵ / ₈
	South India	2,526	16.2.35	78,039	+	416	46	3,641,123	3,546,740	—	94,383	"	119	115	116	67 ¹ / ₂
	Various.	Beira-Umtali	204	Dec., 1934	55,495	+	6,077	13	180,985	149,024	+	31,961	—	—	—	—
Bilbao River & Cantabrian		15	Feb., 1935	2,061	—	365	8	4,310	3,243	+	1,067	—	—	—	—	—
Egyptian Delta		621	28.2.35	5,180	—	468	48	222,142	217,789	+	4,353	Prf. Sh.	215 ¹ / ₂	13 ⁴ / ₈	17 ⁵ / ₈	55 ⁵ / ₈
Great Southern of Spain		104	2.3.35	1,763	—	415	9	17,503	18,967	—	1,464	Inc. Deb.	4	3 ¹ / ₂	3 ¹ / ₂	Nil
Kenya & Uganda		1,625	Jan., 1935	239,686	+	47,245	4	239,686	192,441	+	47,245	"	—	—	—	—
Manila		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mashonaland		913	Dec., 1934	109,744	—	19,028	13	342,255	277,053	+	65,202	B. Deb.	50	33	45 ¹ / ₂	71 ¹ / ₂
Midland of W. Australia		277	Jan., 1935	13,177	—	2,178	30	99,124	95,750	+	3,374	1 Mg. Db.	101	93	103	47 ¹ / ₂
Nigerian		1,905	19.1.35	56,208	—	3,762	42	1,564,546	1,378,244	+	186,302	Inc. Deb.	100	93	96 ¹ / ₂	53 ¹ / ₂
Rhodesia		1,538	Dec., 1934	181,616	—	32,320	13	556,652	465,394	+	91,258	4 p.c. Db.	104 ⁷ / ₈	97 ¹ / ₂	105	31 ¹ / ₂
South African		13,217	9.2.35	540,560	—	77,499	45	23,246,765	20,479,160	+	2,767,605	"	—	—	—	—
Victorian		6,172	Nov., 1934	848,836	—	18,775	21	3,881,659	3,768,192	—	113,467	"	—	—	—	—
Zafra & Huelva	112	Jan., 1935	11,383	—	1,526	4	11,383	12,909	—	1,526	"	—	—	—	—	

* Maghi Fair.

† Receipts are calculated @ 1s. 6d. to the rupee. ‡ Ex dividend. Salvador receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rate of exchange and not on the par value.